Docket		A.21-05-001 et al.
Exhibit Number	:	
Commissioner	:	Darcie L. Houck
Administrative Law Judge	:	Robert Haga
Cal Advocates Witness	:	Aaron L. Rothschild

PUBLIC ADVOCATES OFFICE

PUBLIC UTILITIES COMMISSION
STATE OF CALIFORNIA

CORRECTED DIRECT TESTIMONY
OF
AARON L. ROTHSCHILD

Cost of Capital Proceedings

Application (A.) 21-05-001, A.21-05-002, A.21-05-003, A.21-05-004

California American Water Company, California Water Service Company, Golden State Water Company, and San Jose Water Company

Corrected April 29, 2022

San Francisco, California
January 31, 2022

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I. STATEMENT OF QUALIFICATIONS

Q. PLEASE STATE YOUR NAME, TITLE, AND BUSINESS ADDRESS.

A. My name is Aaron L. Rothschild. My title is President, and my business address is 15 Lake Road, Ridgefield, CT.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am President of Rothschild Financial Consulting ("RFC").

Q. PLEASE STATE YOUR EDUCATIONAL ACHIEVEMENTS AND PROFESSIONAL DESIGNATIONS.

A. I have a B.A. degree in mathematics from Clark University (1994) and an M.B.A. from Vanderbilt University (1996).

Q. PLEASE DESCRIBE YOUR BUSINESS EXPERIENCE.

A. I performed financial analysis in the telecom industry in the United States and Asia Pacific from 1996 to 2001, investment banking consulting in New York, complex systems science research regarding the power sector at an independent research institute, and I have prepared rate of return testimonies since 2002. See Appendix A for my resume.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE CALIFORNIA PUBLIC UTILITIES COMMISSION, OR OTHER STATE COMMISSIONS? IF SO, WHICH COMMISSIONS?

A. Yes, I have previously testified before the California Public Utilities Commission ("CPUC" or "Commission"). My expert witness experience also includes testifying in over

50 cost of capital proceedings before the following state commissions: California, Colorado, Connecticut, Delaware, Florida, New Jersey, Maryland, North Dakota, Pennsylvania, South Carolina, and Vermont. See Appendix B for the list of dockets for each of my testimonies.

Q. ON WHOSE BEHALF ARE YOU PROVIDING THIS TESTIMONY?

A. I am testifying on behalf of The Public Advocates Office at the California Public Utilities Commission ("Cal Advocates").

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to provide my recommendations to the CPUC regarding the appropriate authorized return on equity ("ROE") for the four Class A Water Companies ("the CCAWCs" or "Companies") for the years 2022-2024. My overall recommendation incorporates the capital structure and cost of debt recommendations of Cal Advocates' witness Mr. Jawadul Baki as provided in his Direct Testimony. The four Class A Water Companies that are applicants in this proceeding are:

California American Water Company ("CAWC");
California Water Service Company ("CWSC");
Golden State Water Company ("GSWC");
San Jose Water Company ("SJWC").

The relevant application numbers are: California American Water Company (21-05-001), California Water Service Company (21-05-002), Golden State Water Company (21-05-003), and San Jose Water Company (21-05-004).

Q. WHAT IS THE DIFFERENCE BETWEEN THE CCAWCS' COST OF EQUITY AND THEIR AUTHORIZED RETURN ON EQUITY?

A. The cost of equity ("COE" and "cost of equity" are used interchangeably throughout the testimony) is the market-based return investors expect to earn on the market value of any given stock. As it applies to this consolidated proceeding, it is the return investors require to provide equity capital to the CCAWCs. The appropriate authorized ROE is based on the Commission's determination of the COE at the time of the proceeding based on the evidentiary record, which incorporates investor expectations. Once the Commission issues an authorized ROE, the market-based COE will continue to fluctuate as capital markets inevitably continue to change. The authorized ROE is based on a snapshot of the COE, which is constantly changing.

Q. PLEASE DEFINE THE APPROPRIATE RATE OF RETURN.

A. The appropriate Rate of Return (ROR) is based upon the weighted overall cost of capital (WACC) of the current cost of debt and equity at the time of this proceeding. The weighted cost rate is calculated by multiplying the capital structure ratios of the sources of capital (debt, preferred equity, and equity) times respective cost rates. The ROE and ROR can be adjusted up or down in the next cost of capital proceeding based on the market-based cost of capital (equity and debt) at that time.

$$\text{WACC} = \text{Cost of Debt X Debt Ratio} + \text{COE X Common Equity Ratio}.$$

Q. CAN THE ROE AND ROR BE CHANGED IN BETWEEN WATER COST OF CAPITAL PROCEEDINGS IN CALIFORNIA?

A. Yes. The Water Cost of Capital Mechanism ("WCCM") adds an extra level of capital market risk protection to investors because if interest rates rise or fall significantly between now and the next proceeding, authorized ROEs can be adjusted accordingly. Adopted in CPUC Decision D.09-07-051, the WCCM provides an automatic adjustment to the adopted ROE when the average Moody's utility bond rates change by more than 100 basis points.

II. INTRODUCTION AND SUMMARY OF RECOMMENDATIONS

Q. HOW IS YOUR TESTIMONY ORGANIZED?

A. First, I provide a summary of my recommendations, an overview of cost of equity concepts, and how current capital markets relate to my cost of equity calculations. Second, I provide a more detailed discussion of current capital markets. Third, I provide a detailed explanation of the various models I use in my cost of equity calculations. Lastly, I provide an evaluation of the CCAWCs' rate of return testimony.

Q. PLEASE PROVIDE A SUMMARY OF YOUR RECOMMENDATIONS.

A. Table 1 below shows my ROE recommendations for the CCAWCs:

TABLE 1: ALR RECOMMENDED ROES

	Recommended ROE Range	Recommended ROE
California American Water Company	7.00% - 8.04%	7.52%
California Water Service Company	7.28% - 8.33%	7.81%
Golden State Water Company	6.99% - 8.03%	7.51%
San Jose Water Company	7.13% - 8.17%	7.65%

Exhibit ALR-1

Table 2 through Table 5 starting on page 5 show my ROE recommendations along with Cal Advocates' witness Mr. Jawadul Baki's capital structure and cost of debt recommendations as provided in his Direct Testimony to arrive at an overall rate of return for each of the CCAWCs:

TABLE 2: ALR RECOMMENDED ROE AND RESULTING ROR - CALIFORNIA AMERICAN WATER COMPANY
Application No. 21-05-001

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	43.45%	4.32%	1.88%
Short-Term Debt	0.00%	0.00%	0.00%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	56.55%	7.52%	4.25%
Rate of Return			6.13%

Exhibit ALR-1

TABLE 3: ALR RECOMMENDED ROE AND RESULTING ROR - CALIFORNIA WATER SERVICE COMPANY
Application No. 21-05-002

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	50.56%	4.23%	2.14%
Short-Term Debt	0.00%	0.00%	0.00%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	49.44%	7.81%	3.86%
Rate of Return			6.00%

Exhibit ALR-1

TABLE 4: ALR RECOMMENDED ROE AND RESULTING ROR - GOLDEN STATE WATER COMPANY
Application No. 21-05-003

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	43.15%	5.03%	2.17%
Short-Term Debt	0.00%	0.00%	0.00%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	56.85%	7.51%	4.27%
Rate of Return			6.44%

Exhibit ALR-1

TABLE 5: ALR RECOMMENDED ROE AND RESULTING ROR - SAN JOSE WATER COMPANY
Application No. 21-05-004

	Capital Structure Ratios	Cost Rate	Weighted Cost Rate
Long-Term Debt	46.74%	5.46%	2.55%
Short-Term Debt	0.00%	0.00%	0.00%
Preferred Equity	0.00%	0.00%	0.00%
Common Equity	53.26%	7.65%	4.08%
Rate of Return			6.63%

Exhibit ALR-1

Q. ARE YOU RECOMMENDING A SPECIFIC ROE OR AN ROE RANGE FOR EACH APPLICANT?

A. I recommend both a range of appropriate ROEs and a specific point within that range that I feel would be the most appropriate for each applicant. As I explained in the hearings in the recent Blue Granite Water Company case,[1] applying the various COE models results in a range for the market-based COE and not a precise number. The range that I recommend for each applicant already eliminates the extreme ends of the results of my models and reflects the range of ROEs I feel confident will allow that applicant to raise the capital they need to provide safe and reliable service. However, I also recommend a specific ROE within that range for each applicant because commissions have often requested this specifically. Recommended ranges and specific ROEs for each applicant are summarized in Table 1 on page 4.

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[1] Application of Blue Granite Water Company for Approval to Adjust Rate Schedules and Increase Rates, Before the Public Service Commission of South Carolina, Docket No. 2019-290-WS, Evidentiary Hearings Transcript, pg. 720.

Q. PLEASE PROVIDE A SUMMARY OF HOW YOUR SPECIFIC ROE RECOMMENDATIONS FOR THE CCAWCS COMPARE TO RETURN EXPECTATIONS OF MAJOR FINANCIAL INSTITUTIONS.

A. My specific ROE recommendations of 7.51% to 7.81% for the CCAWCs are in the middle of the range of the expectations published by major banks and brokerage houses (4.1 to 8.9%) shown in Table 6 below. My recommendations are consistent with the COE demanded by investors and enable the CCAWCs to raise the capital needed to provide safe and reliable service.

TABLE 6: U.S. EQUITY RETURN EXPECTATIONS AMONG MAJOR FINANCIAL INSTITUTIONS

Duff & Phelps (December 2020) [1]	**8.0%**
Horizon Actuarial Services, LLC Survey (July 2020) [2]	**5.5 - 8.5%**
50% Percentile: 7.2%	
J.P. Morgan Asset Management - Equity Long-Term Returns (March 2020) [3]	**7.2%**
Charles Schwab - Long-Term Market Returns (March 2020) [4]	**7.1%**

Dates above indicate latest market-data used in analysis.

Sources:

[1] Duff & Phelps Recommended U.S. Equity Risk Premium Decreased from 6.0% to 5.5%, Effective December 9, 2020

[2] Horizon Actuarial Services, LLC, Survey of Capital Market Assumptions Survey, July 2020. Participants Include: Bank of New York Mellon, BlackRock, Franklin Templeton, Goldman Sachs Asset Management J.P. Morgan Asset Management, Merrill Lynch Global Institutional Consulting, Morgan Stanley Wealth Management, Royal Bank of Canada, SunTrust, UBS, The Vanguard Group.

[3] J.P. Morgan Asset Management - LTCMA Market-to-Market: COVID-19 - New Cycle, New Starting Point, April 30, 2020.

[4] Charles Schwab - Why Market Returns May Be Lower and Global Diversification More Important in the Future, June 23, 2020.

Table 6 above shows that major financial institutions are informing their clients to expect returns on their investments similar to the COE I propose in this testimony. The return expectations published by all these financial institutions are based on their own financial models and are broadly for the overall stock market (e.g., U.S. Large Cap, S&P 500). My ROE recommendations are based on government-regulated water utility companies only. Given the relatively lower risk associated with monopoly utilities, it is unlikely that investors would expect to earn a higher return for a utility company than for the overall stock market.

Q. PLEASE COMPARE YOUR ROE RECOMMENDATIONS TO THE ROES REQUESTED BY THE CCAWCS.

A. I recommend different ROEs for the CCAWCs than their witnesses propose because we utilize fundamentally different analytical approaches to calculate the COE. I focus on using market data (e.g., stock prices, bond yields, stock option prices) to measure investors' expectations as much as possible. On the other hand, the CCAWCs' witnesses rely almost exclusively on non-market data, including economists' projections (e.g., interest rates) and analysts' forecasts (e.g., 5-year earnings per share growth), even when market data is available.

The ROEs requested by the CCAWCs, based on their witnesses recommendations, range from 10.30% to 10.75%. As shown in Table 6 on page 7, their requested ROEs are considerably higher than return expectations published by major consulting firms, brokerage houses, and market data publications (5.5% - 8.5%). As I will explain further in my testimony, the CCAWCs' witnesses' ROE recommendations are above current investor expectations for numerous reasons, including flaws in their models and their decision to not rely on investors' interest rate forecasts incorporated in current market yields. As explained in more detail herein, Chart 10 on page 61 shows that the non-market-based interest rate forecasts used by the CCAWCs' witnesses have been consistently inaccurate. Furthermore, analysts' earnings forecasts used by the CCAWCs' witnesses' discounted cash flow (DCF) analyses have been shown to be overly optimistic.[2]

State utility commissions, as well as the financial industry, have found that the COE of regulated water utility companies is significantly lower than the ROEs recommended by the CCAWCs' witnesses in this proceeding. In April 2020, the Public Service Commission of South Carolina determined that Blue Granite Water Company's authorized ROE should be 7.46%.[3]

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[2] Marc H. Goedhart, Rishi Raj and Abhishek Saxena, Equity Analysts: Still too bullish, Spring 2010.

Determining the appropriate cost of capital is a delicate balance. I agree with CAWC's witness Dr. Villadsen that the cost of capital in this proceeding is not a "zero-sum game."[4] If the ROE and overall rate of return is set too low, the CCAWCs will not be able to access the capital needed to provide safe and reliable service. However, charging consumers above the current market rate for capital is not appropriate or necessary to assure capital is available and will result in an unjustified windfall to the CCAWCs. My market-based analysis indicates that the ROEs I recommend for the CCAWCs are sufficient to attract capital, including to fund their capital spending plans. The Water Cost of Capital Mechanism ("WCCM") adds an extra level of capital market risk protection to investors providing capital to the CCAWCs, should interest rates rise significantly between now and the next proceeding.

The ROEs requested by the CCAWCs are also considerably above allowed returns in the following recent electric and water rate cases:

- **8.00%** - On December 21, 2021, the Public Service Commission of South Carolina authorized an ROE of 8.00% for Palmetto Wastewater Reclamation, Inc. (Docket No.2021-153-S – Order No. 2021-814).

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[3] Order Ruling on Application for Adjustment in Rates, Blue Granite Water Company, Docket No. 2019-290-WS, Order No. 2020-306, April 9, 2020, page 43.
[4] Dr. Villadsen's Direct Testimony, Page 9, Lines 183-199.

- **7.90% -** On September 1, 2021, the Connecticut Public Utilities Regulatory Authority Public determined that effective November 1, 2021, Eversource's authorized ROE will be 7.90%.[5]
- **7.46%** - On April 9, 2020, the Public Service Commission of South Carolina authorized a ROE of 7.46% for Blue Granite Water Company (Docket No. 2019-290-WS).[6] This decision was upheld by the South Carolina Supreme Court.[7]
- **7.36%** - In Illinois Commerce Commission Docket No. 21-0365 Ameren Illinois proposed a 7.36% ROE in its formula rate update.[8] Formula rates set in Illinois based on a formulaic ROE calculation (current yield on 30-year U.S. Treasury plus 580 basis points).
- **7.36%** - In Illinois Commerce Commission Docket No. 21-0367 ComEd proposed a 7.36% ROE in its formula rate update.[9] Formula rates set in Illinois based on a formulaic ROE calculation (current yield on 30-year U.S. Treasury plus 580 basis points).

Q. IS IT APPROPRIATE TO ALLOW THE CCAWCS AUTHORIZED ROES BASED ON THOSE ALLOWED IN OTHER JURISDICTIONS?

A. As explained below, the CCAWCs' authorized ROEs should be market-based. In other words, they should be based on investors' return expectations as indicated by current market data. Even if it were assumed that all historical authorized ROEs of water utility companies in other jurisdictions are based on accurate market-based COE calculations, they are from the past. The COE should be based on current market conditions. Setting rates based on historical data is like driving a car by looking out the rear-view mirror. Calculating the COE while looking backward is particularly ineffective now because COVID-19 caused significant capital market disruption through most of 2020, and the recovery is happening in real time. Unless authorized ROEs are set based on investors' current expectations as indicated by market data at the time of the proceeding, the resulting rates would either be too low to permit a utility to raise capital on reasonable terms or too high so that ratepayers would be overcharged. For these reasons, I strongly recommend using the results of my market-based methods as confirmed by the equity return expectations of leading financial institutions shown in Table 6 on page 7.

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[5] Docket No. 17-10-46RE03, Proposed Interim Decision, page 27.

[6] Docket No. 2019-290-WS – Order No. 2020-306, page 38.

[7] The Supreme Court of South Carolina, Opinion No. 28055, Heard June 15, 2021 – Filed September 1, 2021.

[8] "Lowest equity return on record to be used in Ameren Illinois' newest rate case," RRA Regulatory Focus, April 16, 2021.

[9] "Fitch Rates Commonwealth Edison's First Mortgage Bonds 'A'", Fitch Ratings, August 5, 2021.

Q. YOU MENTIONED ABOVE THAT SOME RECENT AUTHORIZED ROES HAVE BEEN BETWEEN 7.36% AND 7.90%. SHOULD THESE AUTHORIZED ROES GIVE THE COMMISSION COMFORT THAT YOUR RECOMMENDED ROES WILL ALLOW THE CCAWCS TO RAISE THE CAPITAL REQUIRED TO PROVIDE SAFE AND RELIABLE SERVICE?

A. Yes. As discussed above, it is encouraging for consumers and the general public that commissions are authorizing ROEs that are more in line with the market-based COE. Understandably, I have seen intense pushback from utility companies regarding these lower ROEs because it is their job to grow earnings as much as possible.

Should authorized ROEs continue to become more in line with the market-based COE, it is critical that we continue to analyze the data (e.g., stock prices, credit ratings) to ensure that utility companies have access to capital to provide safe and reliable service.

Q. YOU RECOMMEND THAT THE CCAWCS SHOULD BE AUTHORIZED TO EARN A RETURN ON EQUITY EQUAL TO THEIR MARKET-BASED COST OF EQUITY. PLEASE DEFINE THE COST OF EQUITY.

A. The cost of equity or COE is the return investors expect to earn when they purchase the equity (or stock) of a company. The return investors expect can come in the form of capital gains (stock price appreciation) or dividend payments. As investors buy and sell stock in the market, they convey information about their return expectations and therefore the underlying cost of equity (companies with different risk profiles will have different costs of equity). It is impossible to determine the cost of equity based on accounting information alone (e.g., revenue, net income, equity book value, or return on book equity) as it can only be established by the stock market.

It is important that the cost of equity used to set rates for the CCAWCs in this proceeding be market-based. This makes sense because investor-owned utility companies ("IOUs") raise money from investors. It is thus critical that the authorized ROE be consistent with the market return expectations of investors. If the authorized ROE is below investors' market return expectations, the CCAWCs will not be able to raise the capital required to provide safe and reliable service. On the other hand, if the allowed return is above investors' market return requirements, the CCAWCs' consumers will be paying more than necessary for their service.

Q. DO ANY ROE WITNESSES USE A DIFFERENT DEFINITION FOR THE COST OF EQUITY?

A. Yes. All ROE witnesses I have encountered over my more than 20 years in the industry, including the applicants' four witnesses in this proceeding, define the cost of equity as market-based somewhere in their testimony. However, many of those witnesses, including the four witnesses in this proceeding, implicitly define the cost of equity, at least in part, as a hybrid of accounting returns (return on book equity) and return expectations of "expert forecasters" such as economists and equity analysts. For example, as discussed further below, each of the four witnesses in this proceeding uses Blue Chip or Moody's Analytics interest rate forecasts instead of market-based bond yields as a proxy for the risk-free rate in their CAPM analyses. The four witnesses in this proceeding even go as far as using their personal market speculations to calculate the cost of equity. This characterization of the cost of equity as largely speculative is erroneous and it makes it more challenging for a commission to make an informed decision.

Q. IS YOUR MARKET-BASED COST OF EQUITY RECOMMENDATION BASED ON YOUR OPINION OF FUTURE STOCK PRICE RETURNS?

A. No. Capital markets are unpredictable and as explained above, it is investors' expectations that matter since they are the ones providing the capital. Therefore, I provide an expert evaluation of investors' return expectations as indicated by the current market prices of stocks, bonds, and stock options, without attempting to predict future prices. This is an important topic that I will revisit throughout my testimony.

I do use Value Line and Zacks forecasts to estimate the market-based cost of equity in my Discounted Cash Flow (DCF) analyses. However, I do not use them mechanically and I go to great lengths to distill the sustainable growth component to ensure it is in line with investors' long-term expectations. My Capital Asset Pricing Model (CAPM) is based on a direct measurement of investors' expectations as indicated by market prices instead of analyst forecasts.

Q. PLEASE SUMMARIZE HOW YOU DETERMINED YOUR COST OF EQUITY RECOMMENDATIONS.

A. To arrive at my recommendations, I applied the Constant Growth and Non-Constant Growth versions of the DCF and 8 variations of the CAPM methodologies to a proxy group of 7 publicly traded water utility companies ("RFC Water Proxy Group") using data available through December 31, 2021. To be conservative, I did not take into account the results of the Non-Constant Growth version of the DCF in arriving at my cost of equity recommendations because the results for several of the companies in my proxy group were below their cost of debt. As discussed below, I review capital market data in general and the model results of leading financial institutions as an additional check on the reasonableness of my model results.

Q. ARE YOUR COST OF EQUITY MODELS BASED ON ESTABLISHED METHODOLOGIES?

A. Yes. The purpose of my testimony is to provide the Commission with an independent analysis. However, I do not reinvent the wheel. It is mostly a question of which established methodologies and theories are best to use. There are countless established methodologies and theories used by investors, scholars, and rate of return witnesses. Further, finance does not stand still and can be affected by numerous factors. For example, Wall Street traders have been increasingly using machine learning to make investment decisions, and the use of quantum computing is likely the next new tool.

The Constant Growth DCF model I use is the same one chosen by major financial institutions. For example, J.P. Morgan Chase uses the same sustainable growth form of the DCF method in its 2019 Long-Term Capital Market Assumptions publication.[10] *Principles of Corporate Finance*, a leading financial textbook used in business schools and investment banks around the world, recommends using the very same method I use to calculate the cost of equity for regulated utility companies.[11] As discussed in Section IV. Capital Asset Pricing Model on page 56, my CAPM is based on methodologies used by Value Line, the Chicago Board of Options Exchange (CBOE), and published in peer-reviewed academic journals (e.g., *The Review of Financial Studies*). My CAPM method has also been recognized by other state commissions. On April 9, 2020, the Public Service Commission of South Carolina stated the following:

> Amongst the three witnesses, Consumer Affairs Rothschild's approach was unique in that he included the use of both historical and forward-looking, market-based data in his analysis. Based on the testimony and facts presented, the Commission therefore adopts the recommended ROE of 7.46% proposed by witness Rothschild.[12]

On September 14, 2021, the Connecticut Public Regulatory Authority stated the following:

> The Authority finds Rothschild's market-based approach for determining a reasonable ROE to be credible and persuasive. Specifically, the Authority finds that the incorporation of investor market return expectations into the historically applied DCF and CAPM methodologies enables the Authority, and all docket participants, to better consider a just and reasonable rate of return based on the same prospective basis that base distribution rates are set. As such, the Authority determines that this added layer of analysis provides appropriate protection to the relevant public interests, both existing and foreseeable, pursuant to Conn. Gen. Stat. § 16-19e(a). Therefore, the Authority considered Rothschild's DCF and CAPM calculations, as outlined below, in this Decision; moreover, on a going forward basis, the Authority shall consider a similar approach to incorporating investor

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[10] 23rd Annual Edition, Long-Term Capital Market Assumptions - Time-tested projections to build stronger portfolios, pp. 62-63.

[11] Brealey, Myers, and Allen (2017), Principles of Corporate Finance, 12th Edition, McGraw-Hill Irwin, New York, page 86-87.

[12] Order Ruling on Application for Adjustment in Rates, Blue Granite Water Company, Docket No. 2019-290-WS, Order No. 2020-306, April 9, 2020, page 43.

> expectations into the historically applied DCF and CAPM methodologies in all future rate proceedings.[13]

In California's 2017 Water Cost of Capital proceedings, a company witness acknowledged the validity of RFC's method. California ALJ Bemesderfer stated the following:

> …on cross-examination Vilbert [California Water Service Company witness] admitted that Rothschild's use of the method [b x r method] was "reasonable" and that Rothschild had "implemented the methodology correctly" in arriving at his Water Proxy Group ROE of 8.25%.[14]

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR COST OF EQUITY MODELS.

A. I have determined the cost of equity or COE for the average company in my RFC Water Proxy Group to be between 7.29% and 8.33%.[15] As shown in Table 7 on page 17, the high-end results of my COE models, including eight variations of the CAPM, range between 5.74% and 8.50%, with an upper quartile at 8.33%. The low-end results of my COE models range between 5.50% and 8.28%, with a lower quartile at 7.29%.

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[13] Proposed Interim Decision of the Connecticut Utilities Regulatory Authority, Docket No. 17-10-03RE11, page 21, September 14, 2021.

[14] Proposed Decision of ALJ Bemesderfer, Application 17-04-001, Agenda ID #16274 Ratesetting, page 19, February 6, 2018.

[15] Exhibit ALR-2.

TABLE 7: COST OF EQUITY MODEL RESULTS

DCF	**Low**	**High**
Constant Growth	8.04%	8.17%
Non-Constant Growth	5.50%	5.74%
CAPM		
Spot (Dec. 31, 2021)		
Risk Free Rate - 3-Month T Bill	7.82%	8.08%
Risk Free Rate - 30-Yr T Bond	8.28%	8.50%
3-Mo. Weighted Average (Oct. to Dec. 2021)		
Risk Free Rate - 3-Month T Bill	7.03%	7.17%
Risk Free Rate - 30-Yr T Bond	7.55%	7.66%
Outer Quartile Range	**7.29%**	**8.33%**
Midpoint of Range	**7.81%**	

Exhibit ALR-2

Q. WHY ARE YOU RECOMMENDING SPECIFIC ROES OF BETWEEN 7.51% AND 7.81% FOR THE CCAWCS WHEN THE MIDPOINT OF THE RANGE OF YOUR COST OF EQUITY MODELS IS 7.81%?

A. The specific ROEs I recommend for the CCAWCs may differ from the 7.81% midpoint of my recommend range because a financial risk adjustment is required to account for the specific capital structure recommendations of Cal Advocates' witness Mr. Jawadul Baki for each applicant.

Capital Structure and Financial Risk Adjustment

The capital structure ratios recommended by Cal Advocates' witness Mr. Jawadul Baki are higher than the average common equity ratio (49.3%)[16] of the water utility companies in my proxy group. Therefore, the COE model results based on the companies in my proxy group must be adjusted to reflect Mr. Baki's recommendations. A higher common equity ratio means less debt, a lower chance of financial stress (financial risk), and therefore a lower COE. On the other hand, a lower common equity ratio means more debt, a higher chance of financial stress (financial risk), and therefore a higher COE. Based on a regression analysis of dozens of utility companies, I found a 0.04% reduction in the DCF cost of equity results for every 1% increase in the common equity ratio. Therefore, if the Commission authorizes a capital structure with a higher common equity ratio for a specific applicant, then the authorized ROE for that applicant should be reduced by 0.04% for every 1% its authorized common equity ratio exceeds that of the proxy group.[17]

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[16] Exhibit ALR-5, page 4

Aligning Authorized ROEs with Market-Based Cost of Equity – A Soft Landing

I believe it is prudent to not be overly abrupt while bringing ROEs in line with the market-based COE. As discussed above, numerous recent authorized ROEs for water and electric utilities have been between 7.36% and 8.00%, including the 7.46% ROE for Blue Granite Water Company that was upheld by the South Carolina Supreme Court in September 2021.[18] It is encouraging for consumers and the general public that commissions are recognizing that ROEs should be more in line with the market-based COE. As explained above, applying the various COE models results in a range for the market-based COE and not a precise number. The range I recommend for each applicant is already adjusted for capital structure risk and already eliminates the extreme ends of the results of my COE models – and therefore reflects the range of ROEs I feel confident will allow that applicant to raise the capital they need to provide safe and reliable service. While

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[17] For example, I recommend adjusting CAWC's ROE by -0.29% if rates are set based on Mr. Baki's capital structure recommendation because his recommended capital structure has a common equity ratio of 56.55% versus the average common equity ratio of 49.3% of the 7 companies in my proxy group.

[18] Application of Blue Granite Water Company for Approval to Adjust Rate Schedules and Increase Rates, Before the Public Service Commission of South Carolina, Docket No. 2019-290-WS, and The Supreme Court of South Carolina, Opinion No. 28055, Heard June 15, 2021 – Filed September 1, 2021.

I generally recommend specific ROEs at the midpoint of this range, there is some leeway within this range. I provide the recommended ROE ranges in Table 1 on page 4 so that the Commission can ultimately decide when it is appropriate to authorize market-based ROEs for each applicant given the evidence presented in the record.

Q. WHAT DOES CAPITAL MARKET DATA INDICATE REGARDING HOW THE COVID PANDEMIC HAS AND IS INFLUENCING THE COST OF EQUITY?

A. Market data show that in the early stages of the COVID pandemic, capital market risks increased but have since declined to approximately pre-pandemic levels, as elaborated upon below.

Q. PLEASE EXPLAIN WHAT MARKET DATA SHOW REGARDING HOW INVESTORS' PERCEPTION OF WATER UTILITY EQUITY RISK WAS IMPACTED BY THE COVID PANDEMIC.

A. As shown in Chart 1 on page 20, the prices of the water utility stocks in my RFC Water Proxy Group have been significantly outperforming the overall market over the past six months, which indicates that the cost of equity has likely been decreasing.

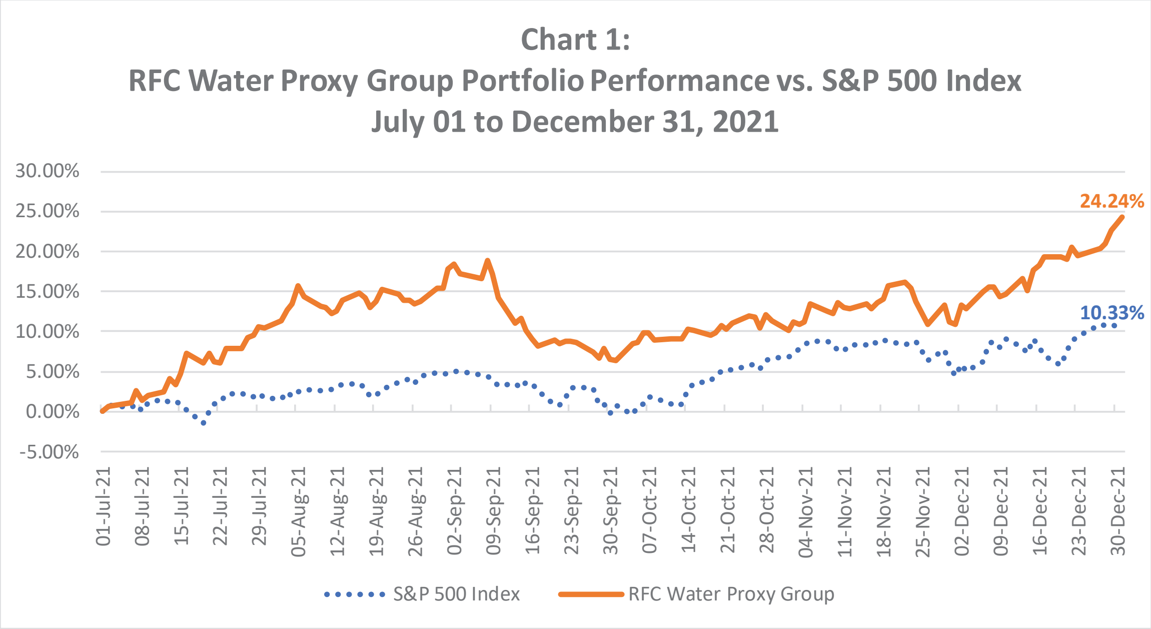
Chart 1:
RFC Water Proxy Group Portfolio Performance vs. S&P 500 Index
July 01 to December 31, 2021

Additionally, forward-looking (option-implied) betas[19] for the RFC Water Proxy Group are lower than before the pandemic, which also indicates that the CCAWCs' cost of equity has decreased since then. As shown in Chart 11 on page 64, the average option-implied beta for the 7 companies in my proxy group averaged 0.93 for the three months ending December 31, 2019 in pre-pandemic market conditions and spiked to almost 1.00 during the spring 2020 initial phase of the pandemic. But the average forward beta has remained mostly under 0.70 since then (with a few brief exceptions), with a somewhat higher value of 0.78 as of December 28, 2021, likely because of the onset of the Omicron variant. These lower beta values indicate that the cost of equity for water utility stocks has decreased since the initial outbreak of the pandemic and point to a lower cost of equity than before the pandemic.

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[19] As discussed below, beta is a measure of a security's sensitivity to movements in the overall market. A beta of 1 indicates a COE equal to the overall market while a beta higher or lower than 1 indicates a COE higher or lower than the overall market respectively.

Table 8 on page 22 shows a summary of how COVID-19 has impacted financial markets between December 31, 2019 and December 31, 2021. Line 1 of Table 8 shows how the overall stock market (S&P 500) sharply declined during the initial spread of COVID-19, but has fully recovered and is regularly reaching new highs. Line 2 shows that interest rates initially declined sharply (30-year U.S. Treasury yields fell from 2.39% to a low of 1.17% on April 24, 2020 – the lowest point is not shown in the table), bounced back by March 2021, and have since once again gone down and remained below pre-pandemic levels (1.90% as of December 31, 2021). As shown on line 3, in March through December 2020, investors were demanding an increased credit spread to invest in riskier corporate bonds (151 basis point increase from December 2019 to March 2020), but credit spreads have since come down to below pre-pandemic levels (1.85% as of December 31, 2021 vs. 1.98% as of December 31, 2019). Line 4 shows that investors' volatility expectations as measured by the Market Volatility Index (VIX) increased significantly from 13.78 on December 31, 2019 to 75.91 in March 2020 but have since come back down considerably to 17.22 as of December 31, 2021. Line 5 shows that stock option prices indicate that the equity risk premium, which also peaked in March and April 2020, has since come down but remains somewhat elevated when compared to pre-pandemic levels. Lastly, as shown on line 6 of Table 8 and Chart 11 on page 64, option-implied betas for my RFC Water Proxy Group, which peaked in February 2020, have since decreased to levels below those before the pandemic (0.78 on December 31, 2021 vs. 0.84 on December 31, 2019), indicating that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic and therefore to be less risky relative to the market.

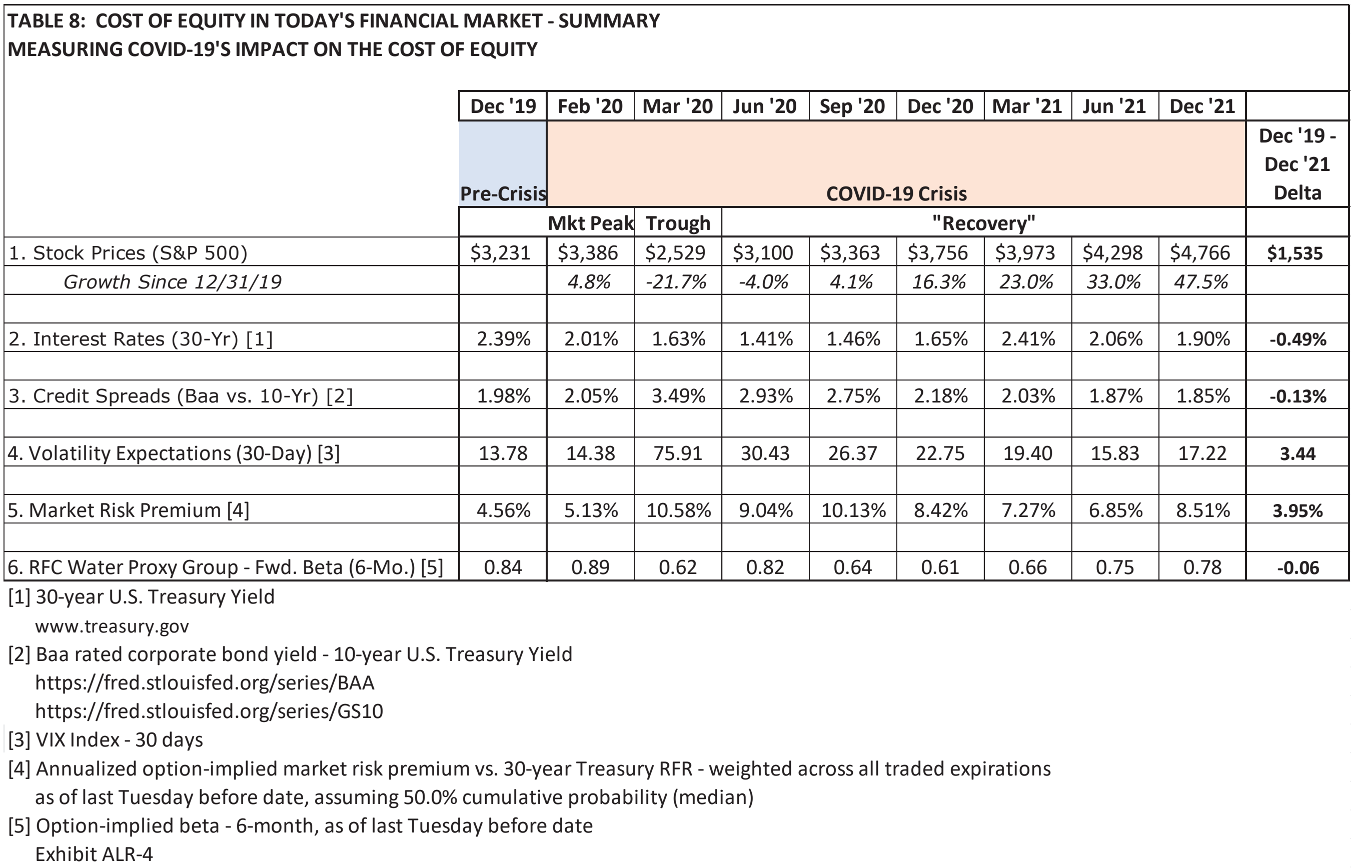

TABLE 8: COST OF EQUITY IN TODAY'S FINANCIAL MARKET - SUMMARY
MEASURING COVID-19'S IMPACT ON THE COST OF EQUITY

	Dec '19	Feb '20	Mar '20	Jun '20	Sep '20	Dec '20	Mar '21	Jun '21	Dec '21	Dec '19 - Dec '21 Delta
	Pre-Crisis	COVID-19 Crisis								
		Mkt Peak	Trough	"Recovery"						
1. Stock Prices (S&P 500)	$3,231	$3,386	$2,529	$3,100	$3,363	$3,756	$3,973	$4,298	$4,766	**$1,535**
Growth Since 12/31/19		*4.8%*	*-21.7%*	*-4.0%*	*4.1%*	*16.3%*	*23.0%*	*33.0%*	*47.5%*	
2. Interest Rates (30-Yr) [1]	2.39%	2.01%	1.63%	1.41%	1.46%	1.65%	2.41%	2.06%	1.90%	**-0.49%**
3. Credit Spreads (Baa vs. 10-Yr) [2]	1.98%	2.05%	3.49%	2.93%	2.75%	2.18%	2.03%	1.87%	1.85%	**-0.13%**
4. Volatility Expectations (30-Day) [3]	13.78	14.38	75.91	30.43	26.37	22.75	19.40	15.83	17.22	**3.44**
5. Market Risk Premium [4]	4.56%	5.13%	10.58%	9.04%	10.13%	8.42%	7.27%	6.85%	8.51%	**3.95%**
6. RFC Water Proxy Group - Fwd. Beta (6-Mo.) [5]	0.84	0.89	0.62	0.82	0.64	0.61	0.66	0.75	0.78	**-0.06**

[1] 30-year U.S. Treasury Yield
www.treasury.gov
[2] Baa rated corporate bond yield - 10-year U.S. Treasury Yield
https://fred.stlouisfed.org/series/BAA
https://fred.stlouisfed.org/series/GS10
[3] VIX Index - 30 days
[4] Annualized option-implied market risk premium vs. 30-year Treasury RFR - weighted across all traded expirations as of last Tuesday before date, assuming 50.0% cumulative probability (median)
[5] Option-implied beta - 6-month, as of last Tuesday before date
Exhibit ALR-4

Q. PLEASE DEFINE YOUR ANALYTICAL APPROACH?

A. My COE recommendation is my opinion of the return investors require to provide equity capital to the CCAWCs based on current capital markets. My recommendation is consistent with the following legal standards set by the United States Supreme Court for a fair rate of return:

> The return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.[20]

And

> …sufficient to…support its credit and…raise the money necessary for the proper discharge of its public duties.[21]

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[20] *Federal Power Commission v. Hope Natural Gas Company* 320 U.S. 591, 603 (1944).

[21] *Bluefield Water Works & Improvement Company v. Public Service Commission of the State of West Virginia* 262 U.S. 679, 692-693 (1923).

Because the cost of equity is not a published figure like a bond yield, some interpretation is required to determine the appropriate market price. My COE recommendation is based on my computation of what the market indicates investors require (return on investment) to provide capital to companies with comparable risk to the CCAWCs.

As explained below, I use current market prices (e.g., stocks, bonds, options), which measure investors' expectations directly, to determine the cost of equity, instead of relying solely on historical data and analyst forecasts.

III. COST OF EQUITY IN TODAY'S FINANCIAL MARKETS

Q. HOW DO RECENT FINANCIAL MARKET DEVELOPMENTS AFFECT THE COST OF EQUITY?

A. The spread of COVID-19 caused the global economy to go into a recession and affected capital markets significantly. It increased uncertainty regarding corporate earnings and as a result, stock prices became much more volatile in the U.S. and around the world. In the first half of March 2020, stock prices crashed, but by mid-August 2020, the S&P 500 had already fully recovered, consistently reaching new highs through the end of December 2021. The unemployment rate increased to nearly 15% in April 2020 but came back down to 5.2% by August 2021.[22] In the first and second quarters of 2020, real gross domestic product fell sharply. In response, the Federal Reserve cut short-term Treasury yields to 0% and began purchasing $120 billion per month of long-term Treasury and corporate bonds.

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[22] https://fred.stlouisfed.org/series/UNRATE.

Congress passed multiple stimulus packages worth trillions of dollars. The combination of the pandemic's impact on the economy and the government actions in response have led to historically low interest rates and a lower cost of debt for corporations, including regulated utility companies. The pandemic's impact on the cost of equity is more complicated than its impact on debt.

During a financial crisis, many investors panic and sell shares in companies without regard for their economics. Others are forced to sell because of margin calls. Many unnerved investors purchase the safest (least risky) securities they can find, including Treasury bonds and utility stocks, in a "flight-to-safety" response. All these activities can impact the cost of equity across sectors, particularly in the short term.

Q. PLEASE DISCUSS SOME RECENT MARKET DEVELOPMENTS THAT IMPACT THE COST OF EQUITY.

A. Below I will discuss in more depth the data presented in Table 8 on page 22. It is important to consider the results of my COE models (DCF and CAPM) in the context of current financial market conditions as follows:

1. **Stock prices crashed and have more than recovered.** The S&P 500, Dow Jones Industrial Average, and other stock indices fell faster in the second half of March 2020 than during the 2007-2008 financial crisis, the crash of 1987, and the Great Depression. As of March 23, 2020, the S&P 500 had fallen approximately 34% from its high reached on February 19, 2020. On August 18, 2020, the S&P 500 set a new high, which represents the fastest recovery (126 trading days) from a bear market. Water utility stocks initially fell slightly less than the overall market (about 26% off their peak versus 34% for the S&P 500) and lagged the market's recovery

in late 2020 and early 2021, but have considerably outperformed the market in the last six months as of the end of December 31, 2021, going up 24.24% vs. 10.33% for the S&P 500 Index.

2. **Low interest rates and a steep yield curve.** As short-term Treasury yields reached 0% shortly after the onset of the pandemic, long-term rates dropped sharply as well. The difference between long-term and short-term yields, referred to as the yield curve, increased. A steep yield curve (where long-term yields are significantly higher than short-term yields) indicates that investors expect the economy to improve.

3. **Credit spreads increased sharply, but have since declined below pre-pandemic levels.** The spread between the yield investors demand to purchase U.S. corporate bonds and U.S. Treasury bonds (see Chart 5 on page 31) increased significantly in the initial phases of the COVID-19 pandemic, but never got as high as it did during the financial crisis of 2007-2008. As of December 31, 2021, the yield spread for Baa credit-rated corporate bonds is 1.85%, below pre-pandemic levels of 1.98% on December 31, 2019, after reaching a high of over 4.00% in March 2020.

4. **Investors' stock price volatility expectations have fallen from highs reached during initial phases of the pandemic**. In March 2020, the VIX Index reached levels not seen since the financial crisis of 2007-2008, and even set all-time records. Volatility expectations remain higher than before COVID-19 but have declined significantly since peaks reached in March 2020.

5. **Option-Implied Market Risk Premiums have declined significantly since the peak reached during the pandemic but remain higher than before the**

pandemic. As discussed in the CAPM section below, stock option data indicate that the premium investors require to invest in stock has likely increased because volatility expectations have increased since the spread of the coronavirus, but as reflected by the VIX Index, it has come down significantly since the period of peak volatility in March 2020.

6. **RFC Water Proxy Group Forward 6-month Betas have decreased.** As discussed in depth in the CAPM section below, stock option data indicate that investors expect water utility stock price movements to be less correlated to the overall market. All else equal, a lower beta indicates a lower cost of equity.

A. Stock Price Trends

Q. WHAT, IF ANYTHING, DOES STOCK MARKET DATA INDICATE WITH REGARD TO THE COST OF EQUITY?

A. As stock prices have shown an overall increase between 1926 and 2020, price-to-earnings (P/E) ratios have increased significantly as well.[23] This indicates that the cost of equity may be decreasing along with the higher stock prices because investors are paying a higher price for the same earnings. For example, an investor paying $100 for a share of a stock with $10 per year of earnings will earn a 10% annual return, assuming no growth. If this stock goes up to $200 per share, the annual earnings decrease to 5%. As shown in Chart 2 on page 27, until the recent COVID-19-related crash, stock prices for the S&P 500 and the RFC Water Proxy Group increased significantly in the nearly 4.7 years since the

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[23] Duff & Phelps, 2021 SBBI Yearbook, Page 10-28.

CCAWCs' last cost of capital proceeding on April 3, 2017.[24] After the significant losses due to COVID-19 in March 2020, the S&P 500 Index and the stock prices for the RFC Water Proxy Group have fully recovered and are up nearly 102.06% and 130.28% as of December 31, 2021, respectively.

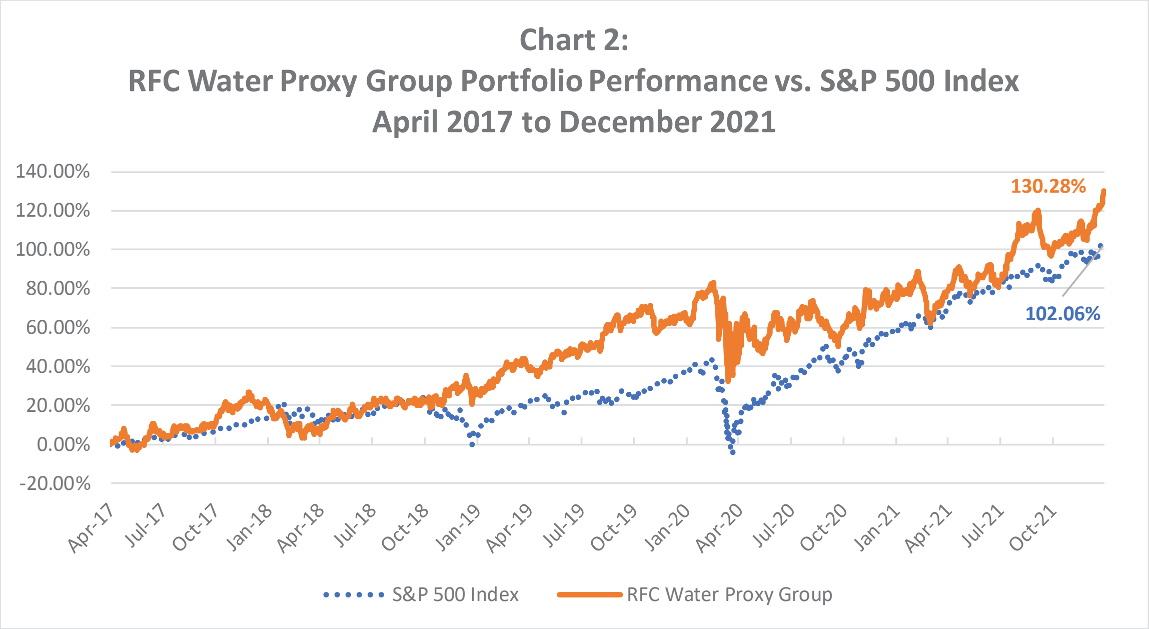

Chart 2:
RFC Water Proxy Group Portfolio Performance vs. S&P 500 Index
April 2017 to December 2021

B. Interest Rates

Q. PLEASE DISCUSS THE CURRENT INTEREST RATE ENVIRONMENT AND WHAT IT INDICATES REGARDING THE COST OF EQUITY.

A. Two significant interest rate developments occurred in response to COVID-19. First, interest rates have fallen significantly since the beginning of COVID-19. Short-term interest rates are now near 0%. As shown on Chart 3 on page 28, yields on 30-year U.S. Treasuries have fallen from 2.39% as of December 31, 2019 to 1.90% as of December 31, 2021. Federal Reserve officials signaled they are on track to raise its short-term interest rate target in March 2022 and as of January 14, 2022 market prices indicate that collectively investors believe there is a 96.9% chance they will do so.[25] Despite statements by the Federal Reserve declaring that it might start reducing its bond purchasing program sooner than expected, long-term interest rates remain historically low. When the Federal Reserve began to ease its "easy-money" policies back in 2013, the resulting increase in interest rates was called a "Taper Tantrum." This time around, the declining interest rates in response to the Federal Reserve's potential policy changes are being called a "Taper Tranquility."[26] Lower interest rates indicate a lower cost of equity for water utility companies because many bond investors sell bonds and purchase utility stocks as interest rates decline.

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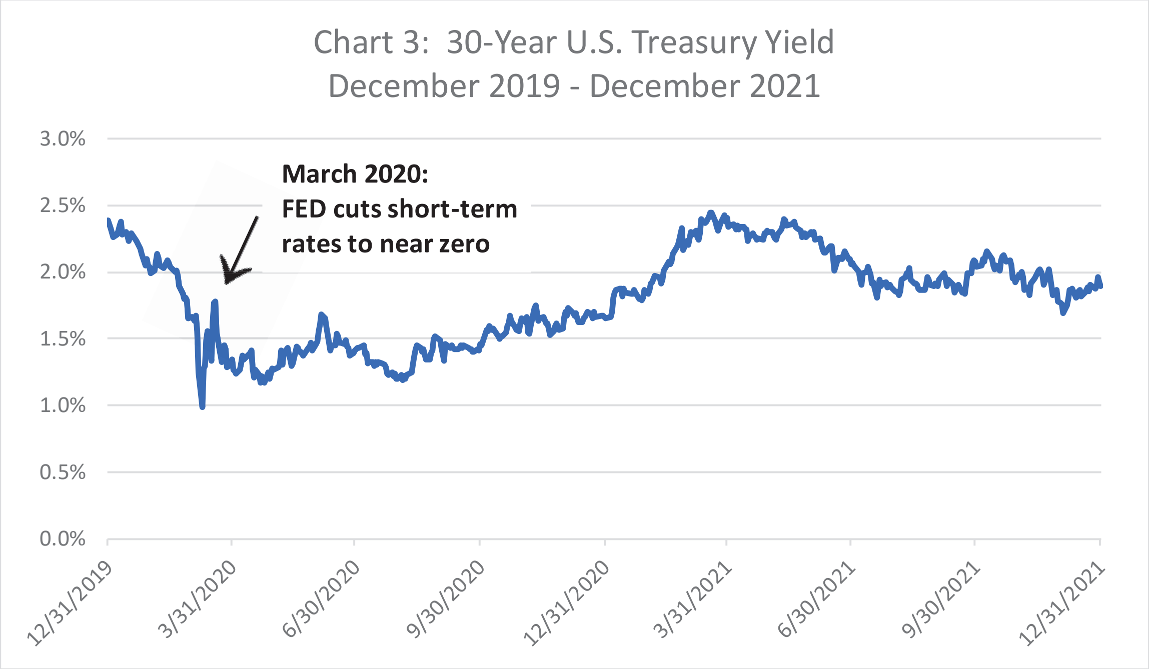
[24] Application Nos. 17-04-001 et al..



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[25] CME FedWatch Tool.
[26] Why There Is No 'Taper Tantrum' This Time Around, WSJ, June 22, 2021.

The second development, as shown in Chart 4 on page 30, is that the yield curve[27] has steepened significantly as a result of the Coronavirus-induced financial crisis.[28] Before the crisis, on December 31, 2019, the yield on the 1-month Treasury bill was 1.48%, increasing to 2.39% for the 30-year Treasury bond, which is less than double. On the other hand, as of December 31, 2021, the yield curve has increased from 0.06% for the 1-month Treasury bill to 1.90% for the 30-year U.S Treasury bond. A steep yield curve indicates investors expect economic conditions to improve because, with expected profitable investment opportunities, they require a significant premium in order to commit their money for long periods of time. On the other hand, when the yield curve is "flat" they do not require a premium to commit their money for long periods of time because they do not expect as many opportunities.

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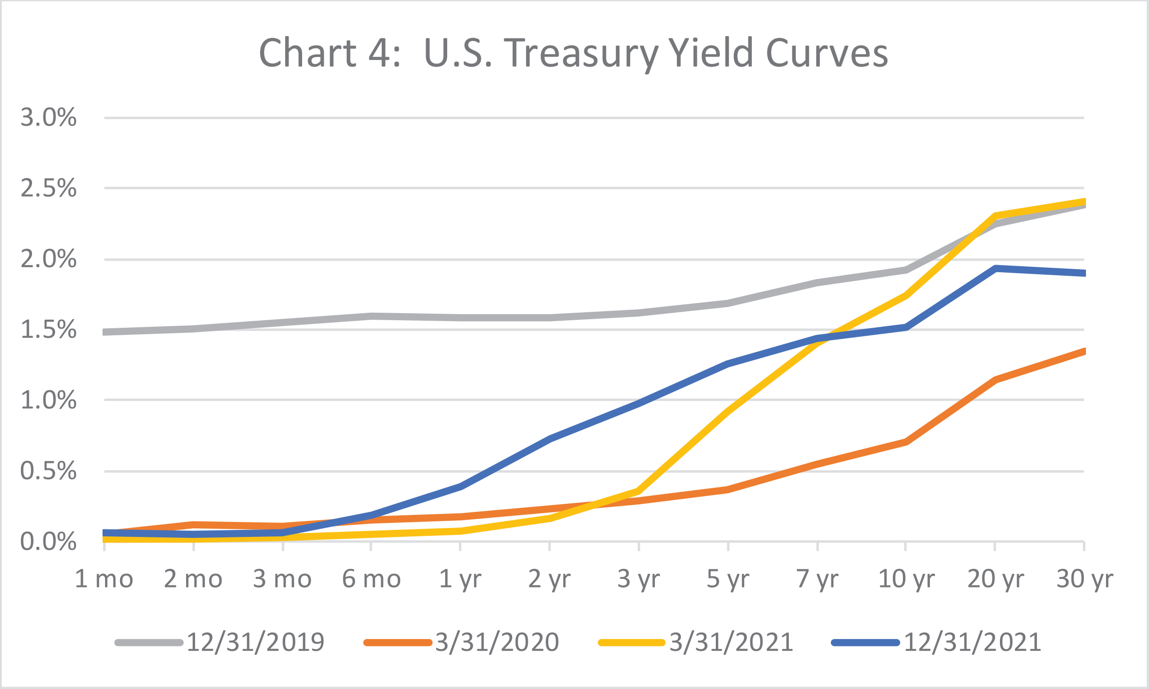
[27] The difference between short-and long-term interest rates is the slope of the yield curve. As this difference increases, the yield curve becomes steeper.

[28] The yield curve was even steeper for years (2009-2017) after the financial crisis of 2007-2008. It was relatively flat (short-term rates were about the same as long-term rates) for most of 2019 and early 2020 before the COVID-19 pandemic.



C. Increasing Credit Spreads

Q. WHAT DOES AN INCREASING CREDIT SPREAD MEAN FOR THE COST OF EQUITY?

A. As shown in Chart 5 on page 31, the yield spread between Corporate bonds and Treasury bonds increased significantly as the Coronavirus has spread throughout the world. The interest rate spread between Baa Corp bonds and 10-year U.S. Treasuries peaked at over 4% in mid-March 2020. This chart clearly shows that yield spreads have declined since their peak to pre-pandemic levels. As of December 31, 2021, the yield spread between Baa Corp bonds and 10-year U.S. Treasuries is 1.85%, more than 200 basis points lower than the peak reached in March 2020 and even lower than before the pandemic. A declining yield spread indicates that investors' appetite for risk has increased since mid-March 2020. As investors' appetite for risk increases, the cost of equity tends to decline.

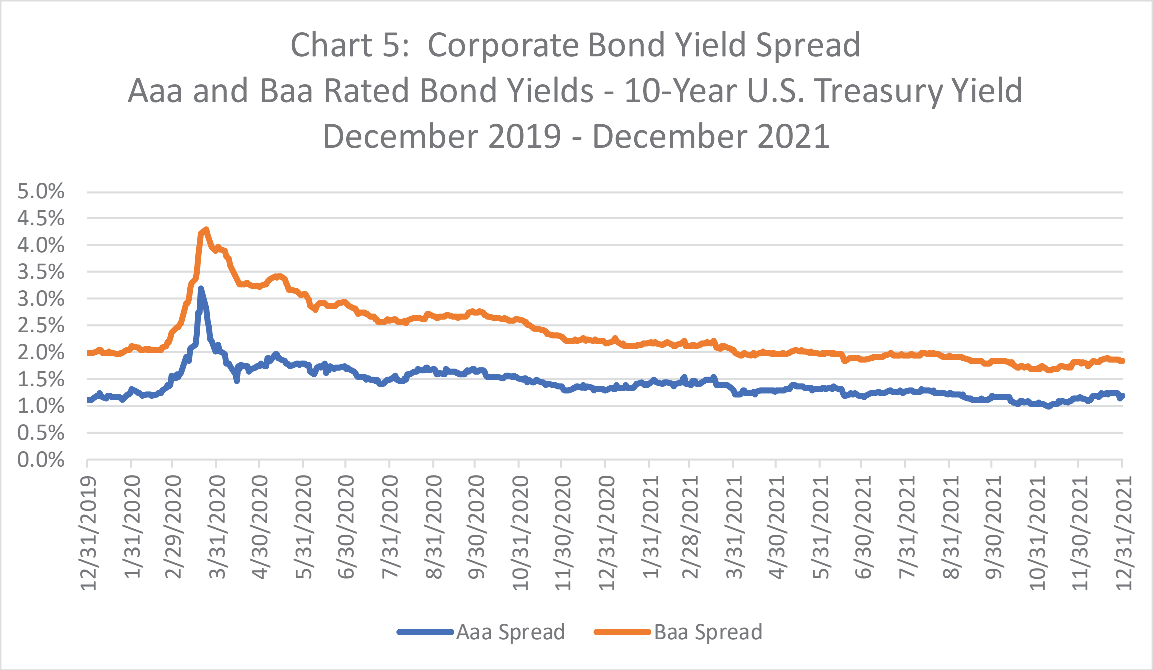


Chart 5: Corporate Bond Yield Spread
Aaa and Baa Rated Bond Yields - 10-Year U.S. Treasury Yield
December 2019 - December 2021

D. Volatility Expectations

Q. PLEASE DISCUSS CURRENT STOCK PRICE VOLATILITY EXPECTATIONS AND WHAT THEY INDICATE REGARDING THE COST OF EQUITY.

A. Volatility, uncertainty, and risk are synonymous. There are two primary types of volatility: "realized volatility" and "implied volatility." The former is based on historical returns, which may or may not represent future volatility. On the other hand, implied volatility is calculated from options data, which indicates investors' future expectations for volatility. As discussed below, the "term structure" of volatility indicates investors' volatility expectations over different forward-looking time periods (e.g., 1-month, 1-year).

Q. PLEASE EXPLAIN THE "TERM STRUCTURE OF VOLATILITY."

A. Investors can expect volatility to increase or decrease over time. Even during the height of a crisis, investors often expect volatility to decrease in coming months or years. In other words, investors expect the current capital market hurricane to pass and the winds to die down. In general (i.e., in "normal" financial markets), investors expect higher volatility for longer time horizons. For example, investors generally expect the chance stock prices will increase or decrease by 10% in 1 year (on an annual basis) to be greater than the chance of a 10% move over the next 30 days (on an annual basis). This makes sense because there is more uncertainty regarding economic and stock market changes the further in the future you look out.

However, during the peak of implied volatility (to date) in mid-March 2020, shortly after the World Health Organization declared COVID-19 a pandemic, the data indicated that investors expected stock price volatility to decrease over time. This implies that investors expected the riskiness of equity investments to decrease over time. As shown in Chart 6 on page 33, before the COVID-19 outbreak, investors expected volatility to increase from less than 15% annually at the 1-month time frame to about 20% annually at the 24-month time frame. At the peak of the COVID-19 outbreak in March 2020, investors expected volatility to decrease from over 70% at the 1-month time frame to about 38% at the 24-month time frame.

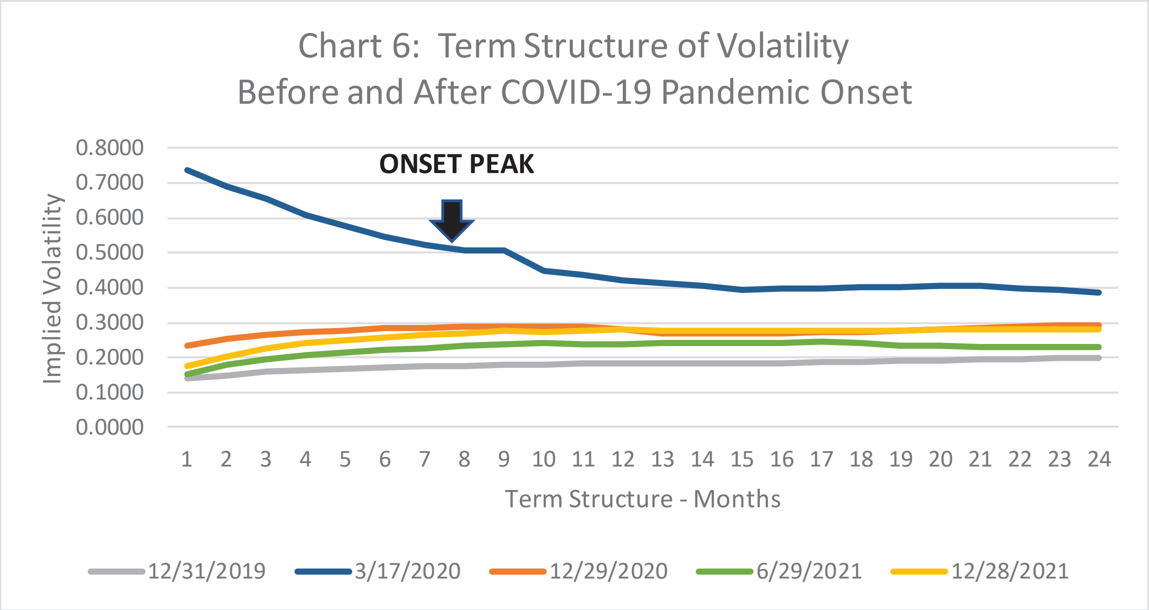


Chart 7 on page 34 provides a 3-dimensional surface[29] to show how the term-structure of volatility has evolved since before the COVID-19 outbreak and how it has changed during and since the outbreak. Chart 6 above is simply three selected cross sections of the same data in the surface in Chart 7. In the surface, one can see that on December 31, 2019, the term structure of volatility is almost flat, increasing slightly from the 1-month to the 24-month time frame. In mid-March 2020, the implied volatility increased over every time period in comparison to December 31, 2019, but one can see that investors expected a declining term structure of volatility. By the end of July 2020, the implied volatility for all time periods had decreased, and the declining term structure moved to a more typical structure in which investors expected higher volatility over longer time periods, as it remains as of December 28, 2021. In late November 2021, the implied volatility increased as the Omicron variant rapidly spread throughout the world, but by the end of December 2021, implied volatility returned to pre-Omicron levels.

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[29] The X axis shows the implied volatility. The Y axis shows the data. The Z axis shows market expectation of future implied volatility of different time frames. Series1 = 1 month and Series24 = 24 months.

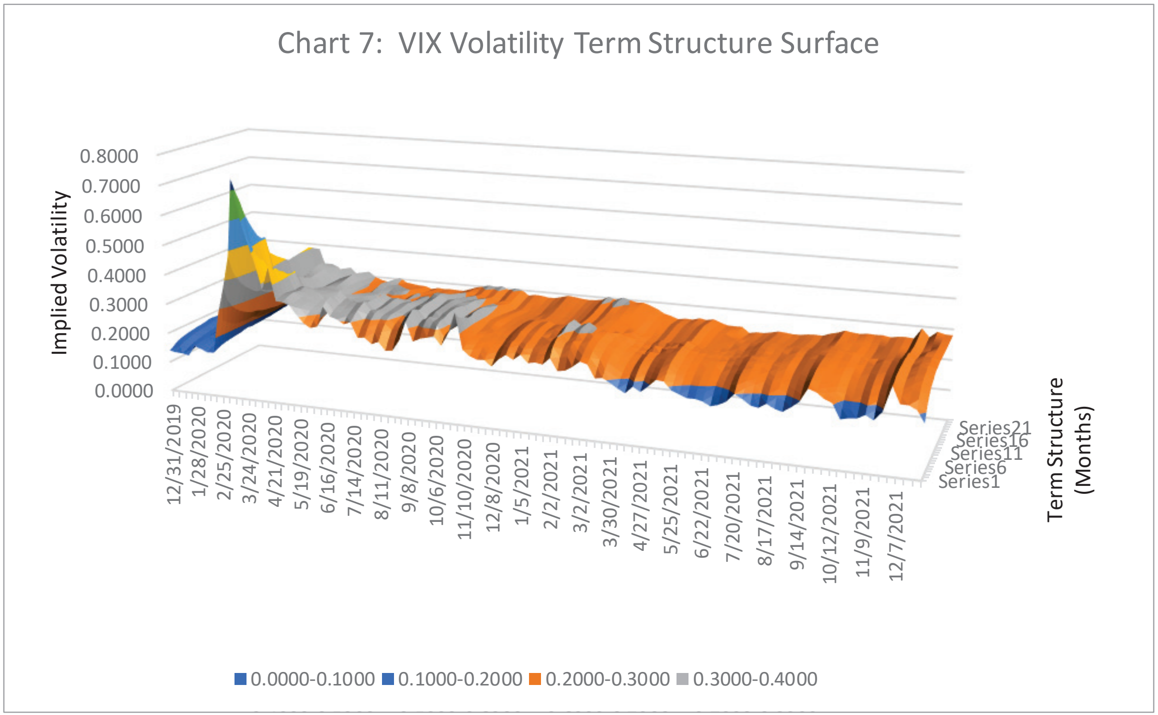

Chart 7: VIX Volatility Term Structure Surface

A declining term structure of volatility is important data to consider in determining the appropriate cost of equity for the CCAWCs because it shows that investors expected risk to decline during the peak of the pandemic's impact on financial markets. Lower risk means a lower cost of equity. Investors' market volatility expectations turned out to be correct. In March 2020, investors expected implied volatility to decline considerably over the next 12 to 24 months, and it has.

Q. HOW HAVE VOLATILITY EXPECTATIONS FOR WATER UTILITY COMPANIES COMPARED TO VOLATILITY EXPECTATIONS FOR THE S&P 500?

A. The dashed red line and the solid orange line in Chart 8 on page 35 show investors' stock price volatility expectations for the overall market (S&P 500) increased significantly as COVID-19 infections spread to the U.S. and continued to grow exponentially around the world. The dashed red line and solid orange line show volatility expectations over the next

30 days and 6 months, respectively. In December 31, 2019, investors expected an annualized change of 13.78% over the next 30 days. In mid-March 2020, investors' volatility expectations peaked at over 80% (on March 16, 2020, a point not actually shown on the chart, which has weekly data on Tuesdays). As of December 28, 2021, investors expect an annualized change of 17.54%.

The blue line in Chart 8 shows that investors' adjusted[30] 6-month volatility expectations for my RFC Water Proxy Group, as indicated by their stock option prices, increased along with the market in mid-March 2020, but to a significantly lesser degree. Investors' 6-month adjusted volatility expectations for water utility companies were higher than for the S&P 500 for the most part from May through August 2020, remained very comparable through mid-July 2021, and have mostly remained below expectations for the market since then through December 2021.

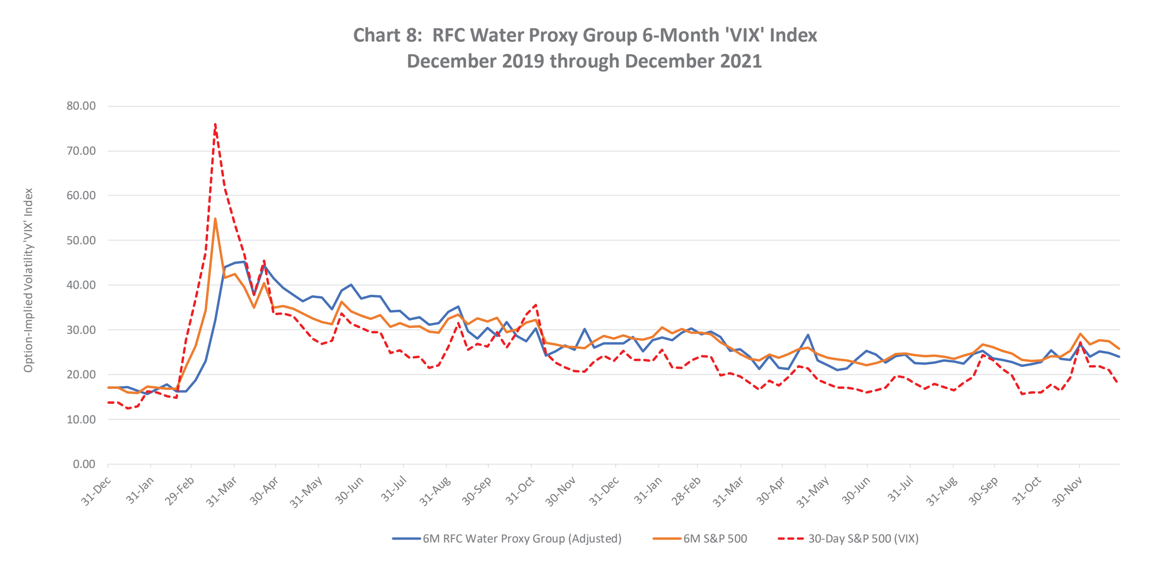
Chart 8: RFC Water Proxy Group 6-Month 'VIX' Index
December 2019 through December 2021

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[30] The implied volatility for individual stocks and small groups of stocks is almost always higher than the overall market because of the effects of diversification, even when the underlying stocks in the smaller portfolio are less risky, as is the case with water utility companies. As a result, Chart 8 adjusts the 6-month expected volatility for the RFC Water Proxy Group by the difference with the 6-month expected volatility for the S&P 500 Index on December 31, 2019 to facilitate the comparison throughout the chart.

As discussed below, changes in implied volatility do not paint the full cost of equity picture. We must consider implied covariance, or how much investors expect the volatility of returns for water utility companies to correlate with the overall market (e.g., S&P 500 Index).

Q. HOW IS COVID-19 IMPACTING FINANCIAL MARKETS AND THE COST OF EQUITY FOR WATER UTILITY COMPANIES?

A. The spread of COVID-19 caused a financial crisis. However, financial data indicate that the capital market upheaval it generated was not long-lasting and did not significantly impact the cost of equity for water utility companies. Investors know that water utility companies provide an essential service that will be used and paid for even during a financial crisis.

Although stock and bond prices remain more volatile than before COVID-19, market data show that investors' volatility expectations have declined for both the overall market and water utility companies since the onset of COVID-19 in mid-March 2020. Investors' volatility expectations are important, but as explained in my CAPM section on page 56, investors' expectations regarding the co-variance between water utility stocks and the overall market are more relevant to cost of equity than volatility expectations alone. Option-implied betas indicate that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic. As explained below, I use stock option data to calculate an "option-implied beta" which is a measurement to determine what investors' expectations are regarding the covariance between the expected returns for the RFC Water Proxy Group and for the S&P 500 Index. On December 31, 2019, the average option-implied beta for my RFC Water Proxy Group was 0.84. As of

December 31, 2021, the average option-implied beta of these 7 water utility companies is 0.78. In other words, investors expect water utility stocks to move only 0.78% for every percent the S&P 500 Index moves. Before the pandemic, investors expected that water utility stocks would move about 0.84% for every 1.0% move of the S&P 500 Index. Declining water utility option-implied betas indicate that investors understand that water utility companies provide an essential service that will be relatively unimpacted by the overall economy.

IV. COST OF EQUITY CALCULATION

A. Overview

Q. PLEASE PROVIDE AN OVERVIEW OF YOUR PERSPECTIVE REGARDING HOW CAPITAL MARKETS RELATE TO THE COST OF EQUITY AND THE OVERALL COST OF CAPITAL

A. The cost of capital is the return investors require to provide capital to the CCAWCs based on current capital markets. The spread of COVID-19 has made it more challenging to determine the current cost of capital because it has drastically increased the speed and intensity of capital market change. To measure the cost of equity accurately during rapid change, it is critical to use current market data. Because of the current financial crisis, it is particularly important to consider model results in the context of extreme financial turbulence. To do this, it is crucial to consider how capital markets and model results have changed over time as this crisis has evolved since its onset in March 2020.

As discussed above, my COE recommendation is my opinion of the return investors require to provide equity capital to the CCAWCs based on current capital markets. My recommendation is consistent with the following legal standards set by the United States Supreme Court for a fair rate of return: "[t]he return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks"[31] and "sufficient to… support its credit and… raise the money necessary for the proper discharge of its public duties."[32]

Because the cost of equity is not a published figure like a bond yield, some interpretation is required to determine the appropriate market price. My cost of equity recommendation is based on my computation of what the market indicates investors require (return on investment) to provide capital to companies with comparable risk to the CCAWCs.

As explained below, I use current market prices (e.g., stocks, bonds, options), which measure investors' expectations directly, instead of relying solely on historical data and analyst forecasts.

A COE based on current market prices (market-based) is superior to a COE based on "expert" forecasts (non-market-based) and historical data (backward looking) for two reasons:

1. The COE that the CCAWCs have to pay investors is based on capital markets. Interest rates remain at historical low levels after a persistent downtrend since the early 1980s. It is possible interest rates will increase,

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[31] Federal Power Commission v. Hope Natural Gas Company 320 U.S. 591, 603 (1944).

[32] Bluefield Water Works & Improvement Company v. Public Service Commission of the State of West Virginia 262 U.S. 679, 692-693 (1923).

but if the marketplace expected interest rates to change, then that would already be part of current prices.

2. Capital markets are unpredictable. Regarding capital markets' unpredictability, investment guru Warren Buffet recently gave the following advice to investors: "[t]hey should not listen to a lot of the jabbering about what the market is going to do tomorrow, or next week or next month because nobody knows."[33]

Current capital markets are our best source of investors' expectations regarding future capital markets. Current market prices of stocks and bonds reflect investors' forecasts for long-term interest rates and capital markets in general. If, indeed, investors in the aggregate should be expecting an increase in interest rates, adding a separate factor for this on top of what is already indicated in market prices would amount to a double-count.

Q. HOW DID YOU ARRIVE AT YOUR COE RECOMMENDATIONS?

A. To arrive at my recommendations, I applied the DCF, including a Constant Growth and a Non-Constant Growth method and a CAPM analysis to a group of similar companies ("RFC Water Proxy Group") using data available through December 31, 2021, as discussed below. In all of my models, I use both historical averages and the most recently available spot data for the inputs wherever it is possible and applicable.

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[33] PBS News Hour, June 26, 2017, Part 1 – America should stand for more than just wealth, says Warren Buffett.

Q. CONSIDERING THAT STOCK AND OPTION PRICES AND BOND YIELDS CHANGE DAILY, WOULD IT NOT BE BETTER TO USE HISTORICAL AVERAGES EXCLUSIVELY FOR THE INPUTS IN YOUR MODELS?

A. Not necessarily. Most people would agree that the use of spot market data, the value of a particular input on a particular day, can lead to COE results that can vary over short periods of time. It may therefore be tempting to find a more stable value based on historical averages that are not overly influenced by short-term fluctuations in capital markets. When doing a forward-looking analysis, however, it is equally important to look at the most recent market data as an indication of trends and where a given value is more likely to be in the future. This is a broad and generally accepted principle, as made clear in the following example.

As a simple example using historical stock prices to make the point clear, if Company A's stock price were to go up linearly over the course of one year from $50 to $100, its average stock price over that year would be $75. If Company B's stock price declined linearly from $100 to $50 over the same year, it would have the same exact average stock price of $75. But most people would agree that predicting both stock prices at $75 over the near future would be overly simplistic and leave readily accessible forecasting data unused. Without relying on any additional data, at the very least, it would stand to reason that in the near future, Company A's stock price is more likely to be between $75 and $100 than Company B's stock price, and that Company B's stock price is more likely to be between $50 and $75 than Company A's stock price. These observations cannot be made by looking at the yearly averages alone and must take the most recent data into consideration.

The point above does not eliminate concerns regarding the effect of daily fluctuations in market data, especially during periods of volatility. As a result, it is important to consider both averages and recent spot values when using market data for forward-looking analyses. That is precisely my approach when using market data that are expected to continue to fluctuate, such as stock prices, dividend yields, betas, and market risk premia.

Q. CAN A DIFFERENCE OF ONE DAY IN THE SELECTION OF SPOT DATA HAVE A SIGNIFICANT POSITIVE OR NEGATIVE EFFECT ON ROE RESULTS? IF SO, HOW DO YOU GO ABOUT CHOOSING WHICH DAY TO USE FOR MARKET-BASED SPOT DATA?

A. Daily fluctuations in stock prices, resulting dividend yields, betas, etc., all have an impact on resulting ROE calculations, especially when using recent spot values for market data. Such is the nature of market data, which change from day to day. This is rightfully noted as a potential risk of using spot data, but given the stated benefits of using recent spot data for forward-looking analyses, there are ways to address such potential pitfalls.

For this reason, it is very important to establish consistent methodologies that eliminate the possibility of personal bias, especially when using spot market data. I consistently use the last trading day of the last full calendar month before my schedule preparations for all market-based spot data and as the last day for all historical market-data averages.

It is important to keep in mind that even averages fluctuate over time, and all responsible data analysts must find a consistent and reproducible way to “freeze time” to work with such fluctuations while eliminating bias.

It is also important to point out once again that I use recent spot market-data to establish one benchmark for market-based inputs, which are balanced by the use of historical averages, as stated previously.

B. Proxy Group Selection

Q. PLEASE EXPLAIN HOW YOU SELECTED THE COMPANIES IN YOUR COMPARABLE PROXY GROUP?

A. My comparable proxy group, referred to as the RFC Water Proxy Group, consists of the 7 publicly traded water utility companies included in ~~covered by~~ Value Line's Water Utility Industry Report.[34] These companies are:

TABLE 9: RFC WATER PROXY GROUP COMPOSITION

	Company Name	Ticker
1	AMER.STATESWATER	AWR
2	AMERICANWATER	AWK
3	ESSENTIALUTIL.	WTRG
4	CALIFORNIAWATER	CWT
5	MIDDLESEXWATER	MSEX
6	YORKWATER	YORW
7	SJWGROUP	SJW

C. Discounted Cash Flow

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR DCF MODELS.

A. I used both the constant growth form of the DCF method, which determines growth based on the sustainable retention growth procedure, and a non-constant growth DCF method.

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[34] Value Line Water Utility Industry Report, April 8, 2022.

My constant growth form DCF analysis indicates a COE range of between 8.04% and 8.17% for the RFC Water Proxy Group.[35] The results of my non-constant growth DCF method indicate a COE of between 5.50% and 5.74% for the RFC Water Proxy Group.[36]

Q. WHAT IS THE DISCOUNTED CASH FLOW METHOD?

A. The DCF method, is an approach to determining the COE. The method recognizes that investors purchase common stock to receive future cash payments. These payments come from: (a) current and future dividends, and (b) proceeds from selling stock. A rational investor will buy stock to receive dividends and to ultimately sell the stock to another investor at a gain. The price the new owner is willing to pay for stock is related to that buyer's expectation of future flow of dividends and the future expected selling price. The value of the stock is the discounted value of all future dividends until the stock is sold plus the value of proceeds from the sale of the stock.

Q. HAVE INVESTORS ALWAYS USED THE DCF METHOD?

A. While investors who buy stock have always done so for future cash flow, the DCF approach first appeared in the 1937 Harvard Ph.D. thesis of John Burr Williams titled *The Theory of Investment Value*. Author Peter L. Bernstein once stated that "Williams' model for valuing a security calls for the investor to make a long-run projection of a company's future dividend payments…"[37] The Williams DCF model separately discounts each and every future expected cash flow. Dividends and proceeds from the sale of stock are the expected cash flows. Its accuracy is therefore unaffected by non-constant growth rates. Myron

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[35] See Exhibit ALR-3, page 1.

[36] See Exhibit ALR-3, page 2 and Exhibit ALR-3, page 3.

[37] P. BERNSTEIN, *Capital Ideas: The Improbable Origins of Modern Wall Street* (The Free Press, © 1992).

Gordon and Eli Shapiro, who helped to make this method widely used, referred to Williams' work in their paper published in 1956 "*Equipment Analysis: The Required Rate of Profit*."

D. Constant Growth Form of the DCF Model

Q. YOU STATE YOU USED THE CONSTANT GROWTH FORM OF THE DCF MODEL. WHAT IS THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. The constant growth form of the DCF model is a form of the DCF method that can be used in determining the COE when investors can reasonably expect that the growth of retained earnings and dividends will be constant.

Retained earnings are funds that a company keeps in its treasury, so that they are available for future needs, such as operating expenses, capital expenditures, debt payments, and new investments. These retained earnings show investors whether the company is growing, which, in turn, is a measure of the future indicator of dividends and the value of a company's stock.

Q. DESCRIBE HOW THE CONSTANT GROWTH MODEL WORKS.

A. The constant growth model is described by this equation $k = D/P + g$, where: [38]

k= cost of equity (COE);
D=Dividend; and
P=Market price of stock at time of the analysis

and where:

g=the growth rate, where $g = br + sv$;
b=the earnings retention rate;
r=return on common equity investment (referred to below as "book equity");

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[38] M. GORDON, *Cost of Capital to a Public Utility*, at 32-33 (MSU Public Utility Studies 1974).

v=the fraction of funds raised by the sale of stock that increases the book value of the existing shareholders' common equity; and
s=the rate of continuous new stock financing

The constant growth model is therefore correctly recognized to be:

$k=D/P + (br +sv)$

The COE demanded by investors is the sum of two factors. The first factor is the dividend yield. The second factor is growth (dividends and stock price). The logical relationship among these factors is as follows: the dividend yield is calculated based on current dividend payments while growth indicates what dividends and stock price will be in the future.

Q. WHAT OTHER FACTORS IMPACT HOW ONE USES THE CONSTANT GROWTH FORM OF THE DCF MODEL?

A. Sufficient care must be taken to be sure that the growth rate "g" is representative of the constant sustainable growth. To obtain an accurate constant growth DCF result, the mathematical relationship between earnings, dividends, book value and stock price must be respected.

The basic difference between the use of an analysts' earnings per share growth rate in the constant growth DCF formula and using the "br" (**b** (the earnings retention rate) X **r** (rate of return on common equity investment)) approach is that the "br" form, if properly applied, eliminates the mathematical error caused by an inconsistency between the expectations for earnings per share growth and dividends per share growth. Because it eliminates that error, the results of a properly applied "br" approach will be superior to the answer obtained from other approaches to the constant growth form of the DCF model. This is not to say that even a properly applied "br" approach will be perfect. The selfcorrecting nature of a properly applied "br" to forecasted differences in earnings per share and dividends per share growth rates help mitigate the resultant error but should not be viewed as the perfect way to quantify the impact of expected non-constant growth rates.

Q. ARE YOU AWARE OF CLAIMS ALLEGING THAT THE "BR" APPROACH TO THE CONSTANT GROWTH DCF MODEL IS FLAWED BECAUSE IT RELIES ON THE VALUE OF THE FUTURE EXPECTED RETURN ON BOOK EQUITY "R" TO ESTIMATE WHAT THE EARNED RETURN ON EQUITY SHOULD BE?

A. Yes. One common criticism is that it is not reasonable for the DCF to indicate a COE (market return) that is different (lower or higher) than the expected return on book equity (accounting). There are multiple reasons why this concern is unfounded:

1. The constant growth form of the equation using "br" is:

   $$k= D/P + (br + sv)$$

   In this equation, "k" is the variable for the COE, and "r" is the future expected return on equity. The COE, "k," is not the same variable as the future expected earned return on equity, "r." In fact, there often is a large difference between the two.
2. The correct value to use for "r" is the return on book equity expected by investors as of the time the stock price and dividend data are used to quantify the D/P term in the equation. Therefore, even if future events occur that may change what investors expect for "r," the computation of the COE "k" remains correct as of the time the computation was made.
3. The ability of a commission's ROE decision to influence future cash flow expectations is not unique to the retention growth DCF approach. The five-

year analysts' earnings per share growth rate is a computation that is directly influenced by what earnings per share will be in 5 years. Allowed ROEs impact earning – higher allowed returns lead to higher earnings growth because the higher allowed returns the more earnings are available for reinvestment.

Q. CAN CHANGES IN THE ACTUAL EARNED RETURNS IMPACT GROWTH ABOVE AND BEYOND WHATEVER GROWTH RESULTS FROM EARNINGS RETENTION?

A. Yes, but large short-term changes in earnings per share caused by a perceived change in the future expected earned returns are unsustainable. The new perceived earned return on book equity should be part of the computation, but the one-time growth spurt to get there is no more indicative of the sustainable growth required in the constant growth DCF formula than the temporary negative growth that occurs when a company has a bad year.

Q. HOW HAVE YOU IMPLEMENTED THE CONSTANT GROWTH FORM OF THE DCF MODEL IN THIS CASE?

A. I have applied the constant growth form of the DCF model by staying true to the mathematically derived "k=D/P + (br + sv)" form of the DCF model. I have also taken care to fully allocate all future expected earnings to either future cash flow in the form of dividends ("D") or to retained earnings (the retention rate, "b"). This extra accuracy is obtained only when the retention rate "b" is derived from the values used for "D" and "r," rather than independently.

Q. PLEASE EXPLAIN HOW YOU OBTAINED THE VALUES YOU USED IN THE CONSTANT GROWTH FORM OF THE DCF METHOD.

A. The DCF model generally calls for the use of the dividend expected over the next year. A reasonable way to estimate next year's dividend rate is to increase the quarterly dividend rate by half of the current actual quarterly dividend rate. This is a good approximation of the rate that would be obtained if the full prior year's dividend were escalated by the entire growth rate.[39]

I obtained the stock price—"P"—used in my DCF analysis from the closing prices of the stocks on December 31, 2021. I also obtained an average stock price for the 12 months ending December 31, 2021 by averaging the high and low stock prices for the year.

I based the value of the future expected return on equity— "r" —on the average return on book equity expected by Value Line, adjusted in consideration of recent returns. I also made a computation that was based on a review of both the earned return on equity consistent with analysts' consensus earnings growth rate expectations and on the actual earned returns on equity. For a stable industry such as utility companies, investors will typically look at actual earned returns on equity as one meaningful input into what can be expected for future earned returns on book equity. See Exhibit ALR-3, page 1.

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[39] For example, assume a company paid a dividend of $0.50 in the first quarter a year ago, and has a dividend growth rate of 4 % per year. This dividend growth rate equals (1.04)^4-1=0.00985 % per quarter. Thus, the dividend is $0.5049 in the second quarter, $0.5099 in the third quarter, and $0.5149 in the fourth quarter. If that 4 % per annum growth continues into the following year, then the dividend would be $0.5199 in the 1st quarter, $0.5251 in the 2nd quarter, $0.5303 in the 3rd quarter, and $0.5355 in the 4th quarter. Thus, the total dividends for the following year equal $2.111 (0.5199 + 0.5251 + 0.5303 + 0.5355). I computed the dividend yield by taking the current quarter (the $0.5149 in the 4th quarter in this example) and multiplying it by 4 to get an annual rate of $2.06. I then escalated this $2.06 by half the 4 % growth rate, which means it is increased by 2 %. $2.06 x 1.02= $2.101, which is within one cent of the $2.111 obtained in the example.

This return on book equity expectation used in the DCF method to compute growth must *not* be confused with the COE. Since the stock prices for the comparative companies are substantially higher than their book value, the return investors expect to receive on their market price investment is considerably less than the anticipated return on book value. If the market price is low relative to book value, the COE will be higher than the future expected return on book equity, and if the market price is high, then the return on book equity will be less than the COE.

In addition to growing through the retention of earnings, utility companies also grow by selling new common stock. Selling new common stock increases a company's growth. I quantified this growth caused by the sale of new common stock by multiplying the amount that the actual market-to-book ratio exceeds 1.0, by the compound annual growth rate of stock that Value Line forecasts. The results of that computation are shown on line 4 of Exhibit ALR-3, page 1.

Pure financial theory prefers concentrating on the results from the most current price because investors cannot purchase stock at historical prices. There is a legitimate concern, however, about the potential distortion of using just a single price. I present DCF results based on the most recent stock pricing data (December 31, 2021) as well as the average of the high and low stock price over the past 12 months to obtain a range of reasonable values. As shown in Exhibit ALR-3, page 1, the DCF result based on the average of the high and low stock price for the year ending December 31, 2021 is 8.04%. The DCF result based on the stock price as of December 31, 2021 is 8.17%. Exhibit ALR-3, page 1, shows more of the specifics of how I implemented the constant growth form of the DCF model for the RFC Water Proxy Group.

Q. PLEASE EXPLAIN HOW YOU DETERMINED WHAT VALUE TO USE FOR "R" WHEN COMPUTING GROWTH IN YOUR CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The inputs I considered are shown in Footnote [C] of Exhibit ALR-3, page 1. The value of "r" that is appropriate to use in the DCF formula is the value anticipated by investors to be maintained on average in the future. This Exhibit shows that the average future return on equity forecasted by Value Line for the RFC Water Proxy Group between 2021 and 2024-26 is 11.29%. The same footnote also shows that the future expected return on equity derived from the Zacks consensus forecast is 8.35%, and that the actual returns on equity earned by the RFC Water Proxy Group on average were 9.89% in 2018, 9.49% in 2019, and 10.39% in 2020. Based on the combination of the forecasted return on equity derived from the Zacks consensus, the recent historical actual earned returns, and Value Line's forecast, I made the DCF growth computation using a 10.80%[40] value of "r".

Q. WHAT COE IS INDICATED BY THE CONSTANT GROWTH FORM OF THE DCF METHOD THAT YOU RELY ON FOR YOUR RECOMMENDATION?

A. The result of my DCF analysis using the Constant Growth form of the DCF indicates a COE range of between 8.04% and 8.17% for the RFC Water Proxy Group.[41] Since these DCF findings use analysts' forecasts to derive sustainable growth (in part) and on analysts' forecasts of dividend growth and book value growth in the non-constant form of the DCF method, the results should be considered as conservatively high. This is because, as previously mentioned above, analysts' forecasts of such growth have been notoriously overstated.

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[40] I used 10.80% in consideration of historical returns, allowed returns, and Value Line projected returns for the RFC Water Proxy Group.

[41] Exhibit ALR-3, page 1.

My results are not as influenced by overly-optimistic analysts' forecasts as would have been the case had I merely used analysts' five-year earnings growth rate forecasts as a proxy for long-term growth. This is because the DCF methods I use compute sustainable growth rates, rather than growth rates that can exaggerate the growth rate due to assuming that a relatively short-term forecast (5 years) will remain indefinitely.

E. Non-Constant Growth Form of the DCF Model

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE NON-CONSTANT GROWTH FORM OF THE DCF MODEL.

A. The non-constant growth form of the DCF model determines the return on investment expected by investors based on an estimate of each separate annual cash flow the investor expects to receive. For the purpose of this computation, I have incorporated Value Line's detailed annual forecasts to arrive at the specific non-constant growth expectations that an investor who trusts Value Line would expect. This implementation is shown on Exhibit ALR-3, page 2 and Exhibit ALR-3, page 3. In the first stage, cash flow entry is the cash outflow an investor would experience when buying a share of stock at the market price. The subsequent years of cash flow are equal to the dividends per share that Value Line forecasts. For the intermediate years of the forecast period in which Value Line does not provide a specific dividend, the annual dividends were obtained by estimating that dividend growth would persist at a compound annual rate. The cash flow at the end of the forecast period consists of both the last year's dividend forecast by Value Line, and the proceeds from the sale of the stock. The stock price used to determine the proceeds from selling the stock was obtained by estimating that the stock price would grow at the same rate at which Value Line forecasts book value to grow.

Q. WHY DID YOU USE BOOK VALUE GROWTH TO PROVIDE THE ESTIMATE OF THE FUTURE STOCK PRICE?

A. For any given earned return on book equity, earnings are directly proportional to the book value. Furthermore, book value growth is the net result after the company produces earnings, pays a dividend and also, perhaps, either sells new common stock at market price or repurchases its own common stock at market price.

Once these cash flows are entered into an Excel spreadsheet, the compound annual return an investor would achieve as a result of making this investment was obtained by using the Internal Rate of Return (IRR) function built into the spreadsheet. As shown on Exhibit ALR-3, page 2 and Exhibit ALR-3, page 3, this multi-stage DCF model produced an average indicated COE of 5.50% based on the year-end stock price, and 5.74% based on average prices for the year ending December 31, 2021 for the RFC Water Proxy Group.

Q. YOUR NON-CONSTANT GROWTH DCF MODEL USES ANNUAL EXPECTED CASH FLOWS. SINCE DIVIDENDS ARE PAID QUARTERLY RATHER THAN ANNUALLY, HOW DOES THIS SIMPLIFICATION IMPACT YOUR RESULTS?

A. I used the annual model because it is easier to input the data and for observers to visualize what is happening. By modeling cash flows to be annual rather than when they are actually expected to occur causes a small overstatement of the COE.

Q. WHY IS IT A SMALL OVERSTATEMENT OF THE COE IF YOU HAVE MODELED DIVIDENDS TO BE RECEIVED SOME MONTHS AFTER INVESTORS ACTUALLY EXPECT TO RECEIVE THEM?

A. The process of changing from an annual model to a quarterly model would require two changes, not just one. A quarterly model would show dividends being paid sooner and would also show earnings being available sooner. A company that receives its earnings sooner, rather than at the end of the year, has the opportunity to compound them. Since revenues, and therefore earnings, are essentially received every day, a company that is supposed to earn an annual rate of 9.00% on equity would have to earn only 8.62% if the return were compounded daily.[42] This reduction from 9.00% to 8.62% would then be partially offset by the impact of the quarterly dividend payment to bring the result of switching from the simplifying annual model closer to, but still a bit below 9.00%.

Q. BY USING CASH FLOW EXPECTATIONS AS THE VALUATION PARAMETER, DOES THE NON-CONSTANT DCF MODEL STILL RELY ON EARNINGS?

A. Yes. It relies on an expectation of future cash flows. Future cash flows come from dividends during the time the stock is owned and capital gains from the sale of the stock once it is sold. Since earnings impact both dividends and stock price, the non-constant DCF model still relies on earnings.

Every dollar of earnings is used for the benefit of stockholders, either in the form of a dividend payment or earnings reinvested for future growth in earnings. Earnings paid out as a dividend have a different value to investors than earnings retained in the business. Recognizing this difference and properly considering it in the quantification process is a major strength of the DCF model and is why the non-constant DCF model as I have set forth is an improvement over either the price-to-earnings ratio (P/E ratio) or dividend/price (D/P) methods. Comparing the P/E ratios and the dividend yield (D/P) are helpful as a rule of thumb, but they must be used with caution because, among other reasons, two companies with the same dividend yield can have a different COE if they have different retention rates. A DCF model is more reliable than these rules of thumb because it can account for different retention rates, among other factors.

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[42] (1+.0862/365)^365=1.09=9.00 %.

Q. WHY IS THERE A DIFFERENCE TO INVESTORS IN THE VALUE OF EARNINGS PAID OUT AS A DIVIDEND COMPARED TO THE VALUE OF EARNINGS RETAINED IN THE BUSINESS?

A. The return on earnings retained in the business depends upon the opportunities available to that company. If a regulated utility reinvests earnings in needed "used and useful" utility assets, then those reinvested earnings have the potential to earn at whatever return is consistent with ratemaking procedures allowed and the skill of management in prudently operating the system.

When an investor receives a dividend, he can either reinvest it in the same or another company or use it for other things, such as paying down debt or paying living expenses. Although an investor could theoretically use the proceeds from any dividend payments to simply buy more stock in the same company, when an investor increases her investment in a company by purchasing more stock, the transaction occurs at market price. However, when the same investor sees her investment in a company increase because earnings are retained rather than paid as a dividend, the reinvestment occurs at book value. Stated within the context of the DCF terminology: earnings retained in the business earn at the future expected return on book equity "r," and dividends used to purchase new stock earn at the rate "k." When the market price exceeds book value (that is, the market-to-book ratio exceeds 1.0), retained earnings are worth more than earnings paid out as a dividend because "r" will be higher than "k." Conversely, when the market price is below book value, "k" will be higher than "r," meaning that earnings paid out as a dividend earn a higher rate than retained earnings.

Q. IF RETAINED EARNINGS WERE MORE VALUABLE WHEN THE MARKET-TO-BOOK RATIO IS ABOVE 1.0, WHY WOULD A COMPANY WITH A MARKET-TO-BOOK RATIO ABOVE 1.0 PAY A DIVIDEND RATHER THAN RETAIN ALL OF THE EARNINGS?

A. Retained earnings are more valuable than dividends only if there are sufficient opportunities to profitably reinvest those earnings. Regulated utility companies are allowed to earn the cost of capital only on assets that are used and useful in providing utility service. Investing in assets that are not needed may not produce any return at all. For unregulated companies, opportunities to reinvest funds are limited by the demands of the business. For example, how many new computer chips can Intel profitably develop at the same time?

Q. UNDER THE NON-CONSTANT DCF MODEL, IS IT NECESSARY FOR EARNINGS AND DIVIDENDS TO GROW AT A CONSTANT RATE FOR THE MODEL TO BE ABLE TO ACCURATELY DETERMINE THE COST OF EQUITY?

A. No. Because the non-constant form of the DCF model separately discounts each and every future expected cash flow, it does *not* rely on any assumptions of constant growth. The dividend yield can be different from period to period, and growth can bounce around in any imaginable pattern without harming the accuracy of the answer obtained from quantifying those expectations. When the non-constant DCF model is correctly used, the answer obtained is as accurate as the estimates of future cash flow.

Q. WHAT COST OF EQUITY DOES YOUR NON-CONSTANT GROWTH DCF METHOD INDICATE?

A. My non-constant growth DCF method indicates a COE of between 5.50% and 5.74%.[43]

F. Capital Asset Pricing Model

Q. PLEASE DESCRIBE THE CAPM.

A. CAPM stands for "Capital Asset Pricing Model." The CAPM relates return to risk; specifically, it relates the expected return on an investment in a security to the risk of investing in that security. The riskier the investment, the greater the expected return (i.e., the cost of equity) investors require to make that investment.

Investors in a firm's equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm, such as management performance and losing market share to a new competitor. Investors can reduce firm-specific risk by purchasing stocks as part of a diverse portfolio of companies if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market, such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Because the investor has no option but to bear market risk, the investor's cost of equity will reflect that risk. The CAPM predicts that for a given equity security, the cost of equity has a positive linear relationship to how sensitive the stock's returns are to movements in the overall market (e.g., S&P 500). A security's market sensitivity is measured by its beta.[44] As shown in Chart 9 below, the higher the beta of a stock, the higher the company's cost of equity—the return required by the investor to invest in the stock.

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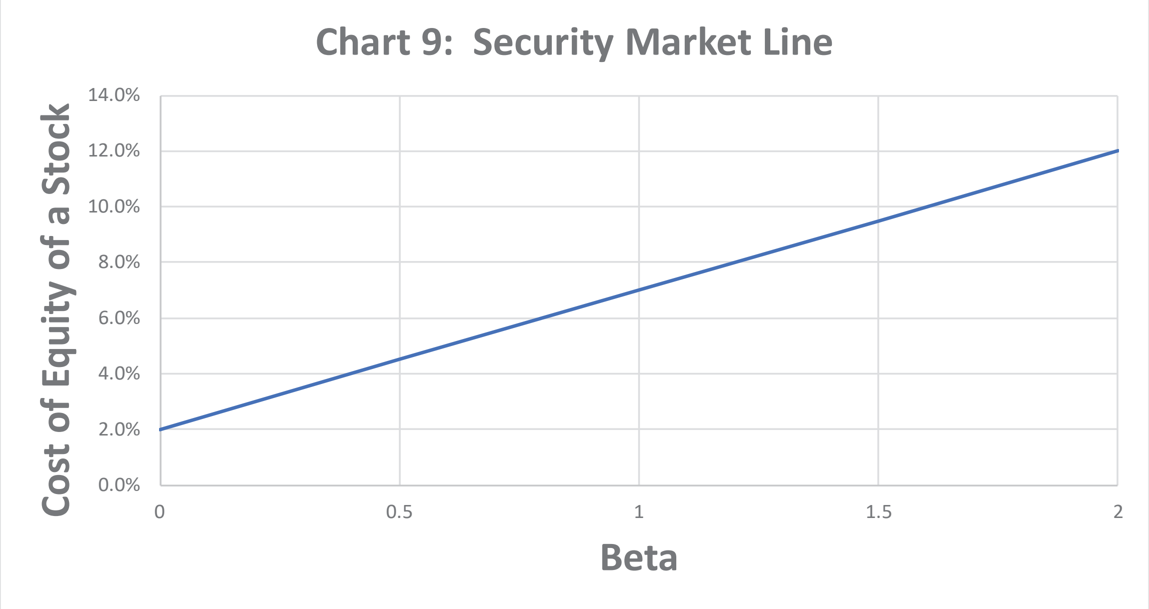
[43] Exhibit ALR-3, page 2 and Exhibit ALR-3, page 3.



Here is the standard CAPM formula:

K = Rf + βí * (Rm – Rf)

Where:

K is the cost of equity;
Rf is the risk-free interest rate;
Rm is the expected return on the overall market (e.g., S&P 500);
[Rm – Rf] is the premium investors expect to earn above the risk-free rate for investing in the overall market ("equity risk premium" or "market risk premium"); and

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[44] The covariation of the return on an individual security with the return on the market portfolio.

βí (Beta) is a measure of non-diversifiable, or systematic, risk.

Q. PLEASE EXPLAIN HOW YOU IMPLEMENTED THE CAPM.

A. First, I determined appropriate values or ranges for each of the three model inputs: (a) Risk-Free Rate, (b) Beta, and (c) Equity Risk Premium. Second, I used the equation above to calculate the cost of equity implied by the model. Below I will explain how I calculated the three model inputs and summarize the CAPM cost of equity numbers resulting from those inputs. Table 10 and Table 11 on page 87 show the results of my CAPM.

Risk-Free Rate

Q. WHAT RISK-FREE RATE DID YOU USE IN YOUR CAPM?

A. It is generally preferable to use the market yield on short-term U.S. Treasury yields as the risk-free rate because these bonds have a beta close to zero. *Principles of Corporate Finance* states "The CAPM… calls for a short-term interest rate."[45] I chose to use a risk-free rate based on both long- and short-term Treasury yields, however, because, as indicated by the steepness of the yield curve,[46] investors with a longer investment horizon would likely use a higher risk-free rate as an opportunity cost for their investment decisions. My short-term risk-free rate is based on the yield of 3-month U.S. Treasury bills and my long-term risk-free rate is based on the yield of 30-year U.S. Treasury bonds. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of December 31, 2021 and weighted averages over the 3 months ending on that date for these two yields.

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[45] Brealey, Myers, and Allen (2017), *Principles of Corporate Finance*, 12th Edition, McGraw-Hill Irwin, New York, page 228.

[46] The yield curve on U.S. Treasury bonds relates the yield to its time to maturity. We say the current yield curve is steep because the difference in yield between short-term (near 0%) and long-term (over 1%) bonds is large in percentage terms.

As outlined in Exhibit ALR-4, page 2, my spot and weighted average short-term risk-free rates are 0.06% and 0.05%, respectively. My spot and weighted average long-term risk-free rates are 1.90% and 1.87%, respectively.

U.S. government bonds are reasonable to use as a risk-free rate because they have a negligible risk of default. The value of short-term U.S. Treasury bills has a relatively low exposure to swings in the overall market. The value of long-term U.S. Treasury bonds is relatively more exposed to the market and therefore must be used with caution. I considered using a risk-free rate based on subtracting the historical spread between long-term and short-term U.S. Treasury bills from current long-term yields, as recommended by some financial textbooks.[47] I did not use this method because in the current capital markets, this method results in an unreasonably low risk-free rate (under 0%).

Regarding my weighted average risk-free rates, it is worth noting that any form of averaging or weighting approach applied to the last 12 months of historical yield data would not have any significant effect on my CAPM results.

Q. WHAT IS YOUR RESPONSE TO ANALYSTS WHO CLAIM THAT THE CAPM MUST BE IMPLEMENTED WITH A LONG-TERM INTEREST RATE (E.G., YIELD ON 30-YEAR TREASURY BOND) AS AN ESTIMATE OF THE RISK-FREE RATE COMPONENT OF THE CAPM?

A. When looking for a security to calculate an estimate of the risk-free rate, it could be argued that it is appropriate to find one with a term or maturity that best matches the life of the asset being financed. In that sense, the 30-year Treasury bond yield can be argued to be ideal for this specific application. However, it is equally important to find a security that has a beta coefficient with the overall market as close to zero as possible, because by the very definition of the risk-free rate in the CAPM model, its movements should have no correlation to the movements of the market. And this is where the problem with the 30-year Treasury bond yield arises, as it has an established non-zero beta. The 3-month Treasury bill yield has a considerably lower beta, and therefore is superior in that respect to the 30-year Treasury bond yield. Neither one is a perfect fit on both fronts, which is why I have chosen to consider both as proxies for the risk-free rate to establish a range for my CAPM results.

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[47] Brealey, Myers, and Allen (2017), *Principles of Corporate Finance*, 12th Edition, McGraw-Hill Irwin, New York, page 228.

Q. HOW DO YOU RESPOND TO ANALYSTS WHO CLAIM THAT THE RISK-FREE RATE SHOULD BE BASED ON INTEREST RATE FORECASTS FROM FIRMS SUCH AS BLUE CHIP FINANCIAL?

A. It is important to recognize that current long-term Treasury bond yields represent a direct observation of investor expectations and there is no need to use "expert" forecasts such as Blue Chip to determine the appropriate risk-free rate to use in a CAPM analysis or any other COE calculations.

Many economists and forecasters will continue to be quoted in the press prognosticating on possible developments that are truly unpredictable. The Nobel Laureate Economist Daniel Kahneman stated the following regarding forecasting:

> It is wise to take admissions of uncertainty seriously, but declarations of high confidence mainly tell you that an individual has constructed a coherent story in his mind, not necessarily that the story is true.[48]

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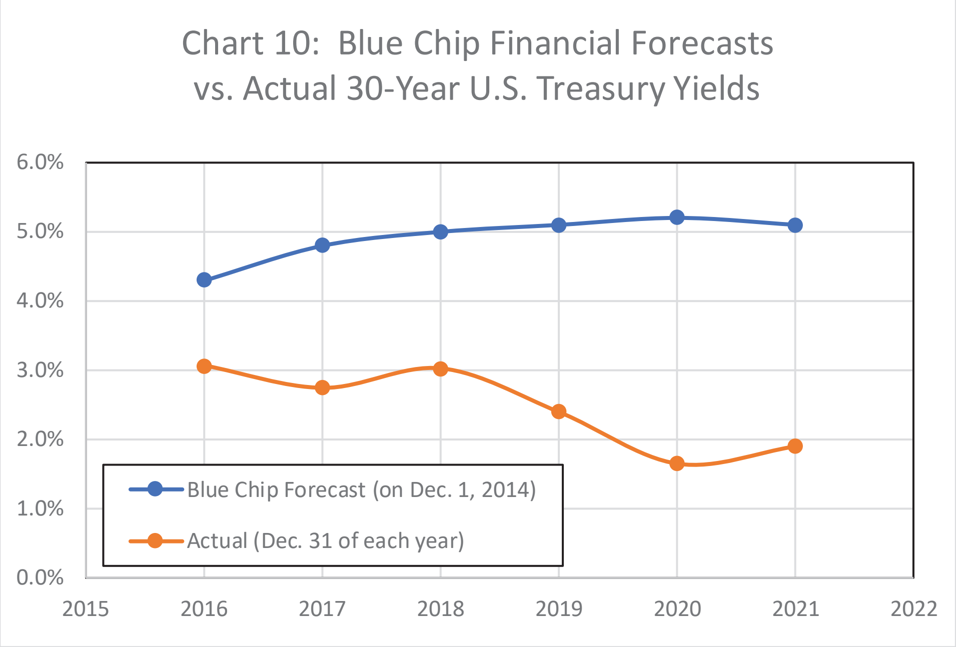
[48] Daniel Kahneman, *Thinking Fast and Slow* (New York: Farrar, Straus, and Giroux, 2011): 212.

As Chart 10 below shows, Blue Chip Financial forecasted in 2014 that 30-Year U.S. Treasury bonds would be over 5% by 2018 while in fact they turned out to be under 2%.



The time covered in Chart 10 above was chosen to provide a concrete example. Blue Chip's interest rate forecasts have been persistently inaccurate. A recent paper published by the Congressional Budget Office determined Blue Chip consensus forecasts exhibited "significant positive bias" between 1984 and 2012 and "have become more biased and less accurate over time."[49]

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[49] *Did Treasury Debt Markets Anticipate the Persistent Decline in Long-Term Interest Rates?,* Congressional Budget Office, Edward N. Gamber, page 2. This paper can be found at: https://www.cbo.gov/system/files/115th-congress-2017-2018/workingpaper/53153-interestrateswp.pdf

Beta

Q. WHAT BETA DID YOU USE IN YOUR CAPM?

A. Since the cost of equity should be based on investor expectations, I chose to use two betas. My "forward beta" is based on forward-looking investor expectations of non-diversifiable risk. My "hybrid beta" is based on both forward-looking investor expectations and historical return data.

Most published betas are based exclusively on historical return data. For example, Value Line publishes a 5-year historical beta for each of the companies it covers. However, it is also possible to calculate betas based on investors' expectations of the probability distribution of future returns. This probability distribution of future returns expected by investors can be calculated based on the market prices of stock options.

Q. WHAT IS A STOCK OPTION?

A. A stock option is the right to buy or sell a stock at a specific price for a specified amount of time. A call option is the right to buy a stock at a specified exercise or strike price on or before a maturity date. A put option is the right to sell a stock at a specified exercise or strike price on or before a maturity date. For example, a call option to purchase Apple Computer stock for $230 on January 17, 2020 allows the owner the option (not the obligation) to buy Apple stock for $230 on that date. At the end of July 2019, Apple stock was trading at about $215 per share. Why would anyone pay for the right to buy a stock higher than the current price? Investors who purchased those call options thought there was a chance Apple stock would be trading higher than $230 on January 17, 2020, and those options gave those investors the right to buy Apple stock for $230 and profit by selling it at the market price on that date, if it was higher. The price of Apple's stock was

$317.98 at the close of trading on January 17, 2020. Therefore, the investor who purchased this call option for $635 on July 31, 2019 earned a profit of $8,163[50] at expiry on January 17, 2020. On the other hand, the investor who purchased an Apple put option with the same expiration date and strike price on July 31, 2019 would have lost the price of the option ($2,248) and gained nothing on the expiration date because the right to sell Apple stock for $230 when the price is over $300 is worthless.

The market prices of put options and call options provide information regarding the probability distribution of future stock prices expected by investors. Using established techniques, I am able to use price data for stock options of my RFC Water Proxy Group companies and the S&P 500 Index to determine investors' return expectations, including the relationship (covariance) between the return expectations for individual RFC Water Proxy Group companies and those for the overall market (S&P 500). This covariance between the expected returns for my RFC Water Proxy Group and for the S&P 500 indicates what investors expect betas will be in the future. I refer to betas based on option price calculations as "option-implied betas."

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE BETAS USED IN YOUR CAPM.

A. Traditionally, the betas used in CAPM calculations are calculated from historical returns. This approach has strengths and weaknesses. An alternative way to calculate betas is to incorporate investors' return expectations by calculating option-implied betas as explained in the previous paragraph. As discussed below, I have chosen to use both historical and option-implied betas in my CAPM analysis. I chose to use option-implied betas in my CAPM analysis because, among other reasons, studies have found that betas calculated based on investor expectations (option-implied) provide information regarding future perceived risks and expectations.[51]

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[50] $8,163 profit from exercising call option ($31,798 from selling at $317.98 market price - $23,000 cost to purchase at $230) - $635 ($6.35 X 100) option purchase price. Note: Each call option is the right to purchase 100 shares.

As shown in Chart 11 below, stock option prices indicate that investors likely expect lower betas for the RFC Water Proxy Group in the future.

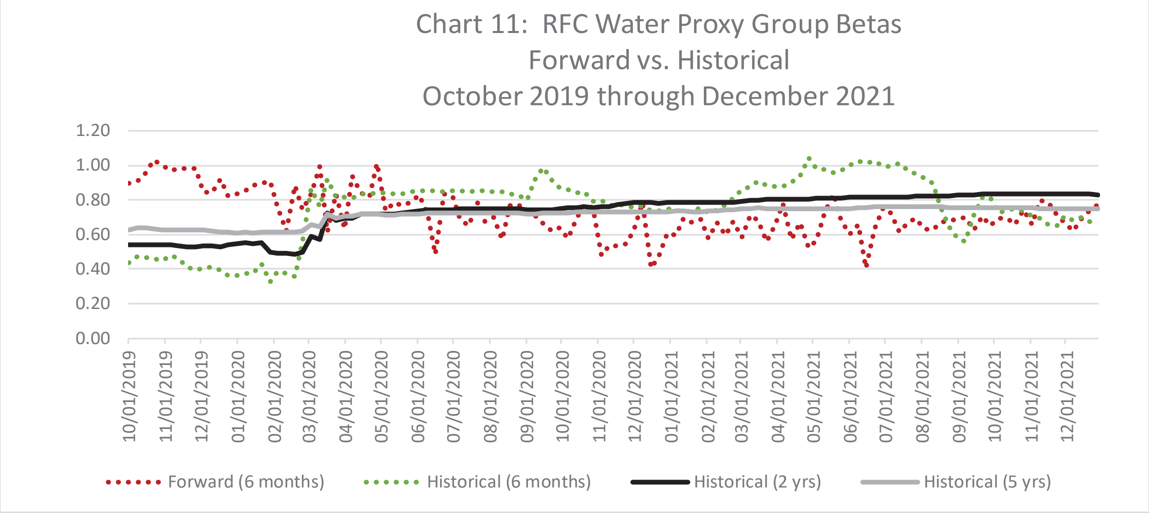

Exhibit ALR-4, page 3 contains the last three months of data used in creating Chart 11 above, which is what I use in my CAPM analysis. Specifically, I use the following two betas in my CAPM analysis:

1. **Hybrid Beta:** 50% Option-Implied Beta (6 months) + 25% Historical Beta (6 months) + 15% Historical Beta (2 years) + 10% Historical Beta (5 years).
2. **Forward Beta:** 100% Option-Implied Beta (6 months).

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[51] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.

Q. PLEASE EXPLAIN HOW YOU CALCULATE HISTORICAL BETAS.

A. I calculate historical betas following the methodology used by Value Line, with some modifications. Specifically, Value Line adheres to the following guidelines:

1. Returns for each security are regressed against returns for the overall market in the following form:

   $$\text{Ln}\,(p^{I}_{t} / p^{I}_{t-1}) = a_{I} + B_{I} * \text{Ln}\,(p^{m}_{t} / p^{m}_{t-1})$$

   Where:

   - p^{I}_{t} is the price of the security I at time t
   - p^{I}_{t-1} is the price of the security I one week before time t
   - p^{m}_{t} and p^{m}_{t-1} are the corresponding values of the market index
   - B_{I} is the regression estimate of Beta for the security against the market index
2. The natural log of the price ratio is used as an approximation of each return and no adjustment is made for dividends paid during the week.
3. Weekly returns are calculated on one day of the week, with a stated preference for Tuesdays to minimize the effect of holidays as much as possible.
4. Betas calculated using the regression method above are adjusted as per Blume (1971)[52] using the following formula:

   $$\text{Adjusted } B_{I} = 0.35 + 0.67 * \text{Calculated } B_{I}$$

There are four differences between my historical beta calculations and Value Line's calculations:

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[52] M. Blume, On the Assessment of Risk, *The Journal of Finance*, Vol. XXVI, March 1971.

1. The first significant difference is that whereas Value Line uses the New York Stock Exchange Composite Index as the market index, I use the S&P 500 Index.
2. Another important difference is that whereas Value Line calculates weekly returns on one day of the week, with a stated preference for Tuesdays, I calculate weekly returns on all days of the week.
3. Value Line only calculates betas every 3 months in their quarterly company reports, whereas I use the same consistent methodology to calculate betas every week during the most recent 3 complete months (October through December 2021).
4. Value Line always uses a 5-year period for the return regression,[53] whereas I calculate historical betas for periods of 6 months, 2 years, and 5 years, as shown in Chart 11 on page 64.

In the following pages, I explain my rationale for making the four modifications above to Value Line's beta calculation methodology.

Q. WHY DO YOU CALCULATE YOUR HISTORICAL BETAS VS. THE S&P 500 INDEX INSTEAD OF THE NYSE COMPOSITE INDEX, AS VALUE LINE DOES?

A. A critical factor in the calculation of a beta coefficient is the choice of index to represent the overall market. Using exactly the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio – sometimes significantly different values (10 basis points or more). It is easy to jump to the conclusion that this points to a flaw in CAPM theory, as different values of beta would result in a different implied cost of equity. However, another key component of the CAPM, the market risk premium, also depends on the choice of market index, which in theory would have an offsetting effect on the COE calculation. This points to the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium. This is a fundamental concept of the CAPM and using betas based on one index with a market risk premium based on a different index yields invalid results.

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[53] They offer betas calculated over different time periods on their website, including 3 years and 10 years.

As stated above, Value Line calculates its published betas based on the NYSE Composite Index. Most methodologies used to calculate the market risk premium, including those I rely on, are based on the S&P 500 Index, so using them in the CAPM together with Value Line betas exactly as published would yield invalid results.

For this reason, I calculate my historical betas versus the S&P 500 Index, making my CAPM approach entirely consistent. This is in contrast to the approach used by numerous witnesses, including the four witnesses in this proceeding,[54] which mixes betas based on a different index (NYSC) than their equity risk premium component (S&P 500), rendering their CAPM results inconsistent and unreliable. Any use of Value Betas together with an equity risk premium based on the S&P 500 Index falls under this unreliable category.

As an aside related to my option-implied betas, using the S&P 500 Index consistently throughout my CAPM has the added benefit that this index has a much larger number of options traded, which makes the calculation of option-implied betas more reliable.

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[54] Ms. Bulkley uses Bloomberg betas as well as Value Line betas. Value Line betas are based on the NYSE Composite Index, whereas Bloomberg betas are based on the S&P 500 Index.

Q. WHY DO YOU CALCULATE YOUR HISTORICAL BETAS USING WEEKLY RETURNS ON EVERY DAY OF THE WEEK AS OPPOSED TO USING ONLY ONE DAY OF THE WEEK, AS VALUE LINE DOES?

A. Using one day of the week to calculate weekly returns for use in the regression analysis used to calculate historical betas has the unintended effect of generating different values of betas depending on the day of the week that is used. To clarify, if one were to use Value Line's precise methodology for calculating a 5-year historical beta for a given company using weekly returns calculated on Tuesdays, the resulting beta value would be different than the resulting value if one were to use the same exact methodology, but using weekly returns calculated on Wednesdays, or any other day of the week. Even though 5-year historical betas should in theory be quite stable and should not change very much from one day to the next, calculating returns on only one day of the week results in differences that can be significant and make no sense conceptually.

I only became aware of this side-effect recently, but it is easy to understand why it happens. Even though there is some correlation due to some overlap, the set of weekly returns calculated on Mondays is a completely different set of numbers than the set of weekly returns calculated on Tuesdays. As a result, there are five 5-year betas that can result from Value Line's methodology, and even though the Monday beta for a given company will change slowly from week to week, the change between the Monday beta and the Tuesday beta, calculated just one trading day apart, can be quite significant.

Since I became aware of this undesirable effect, I began calculating my historical betas based on an all-encompassing set of weekly returns calculated on every trading day in the beta calculation period. This methodology has the effect of averaging out the five possible betas that could result from using only one day of the week for the return calculations,[55] as Value Line does. In this way, a 5-year beta calculated on any two consecutive trading days would only change minimally, as it should.

Using a daily calculation of weekly returns could be criticized for the resulting overlap in a weekly return from Monday to Monday with that from Tuesday to Tuesday. However, given that the overlap is consistent and equal for the net effect of every trading day, no trading day is given undue weight in the regression. Even though the effect of each trading day appears 5 times in the weekly return data, there are also 5 times the total number of weekly returns in the overall set used in the regression, so any individual trading day has the same relative weight than in Value Line's methodology. The fact that the resulting beta value of this aggregate approach turns out to be a sort of average of the five possible values that would result from Value Line's methodology on different days of the week is the final confirmation that this is the superior approach for calculating a historical beta based on weekly returns.

Using a daily calculation of weekly returns has the added marginal benefit of providing more data pairs to be used in historical beta calculations for shorter periods, such as for 6-month historical betas, where instead of 25 return pairs, the regression is performed on 117 return pairs.

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[55] The resulting beta is not a direct arithmetic or geometric average of the other five betas, but rather a regression based on the union of all five possible sets of weekly returns.

Q. ARE THERE ADDITIONAL BENEFITS TO DOING YOUR OWN HISTORICAL BETA CALCULATIONS?

A. Doing my own historical beta calculations using Value Line's established methodology allows me to see how beta values change from week to week and to use the most up-to-date beta calculations instead of relying on stale beta values that can be more than 3 months old.

Q. WHY DO YOU USE PERIODS OF 6 MONTHS, 2 YEARS, AND 5 YEARS FOR YOUR HISTORICAL BETA CALCULATIONS, AS OPPOSED TO RELYING EXCLUSIVELY ON THE 5-YEAR PERIOD USED BY VALUE LINE?

A. Using shorter periods for the return regression analysis portion of the historical beta calculation allows me to see if the correlation between the returns of each of the companies in my RFC Water Proxy Group and those of the S&P 500 Index has changed in the last 2 years or 6 months. Using a 5-year period exclusively tends to make recent changes in the correlation more difficult to identify because of the weight of 5 years of data.

Q. WOULD YOU AGREE THAT CHANGES IN MARKET DYNAMICS WILL HAVE A LARGER EFFECT ON 6-MONTH HISTORICAL BETAS THAN THEY WILL ON 2-YEAR OR 5-YEAR HISTORICAL BETAS?

A. Yes. As with other historical metrics based on a given time period, say, average stock prices, the longer the time horizon under consideration, the more data points are considered, and the smaller the effect of any one given change in the data set.

Q. IS THIS LARGER EFFECT ON 6-MONTH HISTORICAL BETAS FROM CHANGES IN MARKET DYNAMICS A GOOD OR A BAD THING?

A. The answer depends on what the beta will be used for. I would argue that in any attempt to forecast the beta coefficient of a company for any forward-looking analysis such as the cost of capital calculations in this proceeding, more recent historical data should be given more relevance than data from 5 or 10 years ago. The weight of 10 years of data makes a beta coefficient react extremely slowly to market developments. Even pronounced permanent market changes can take more than 6 months to have a detectable effect on a 10-year beta.

As with using spot values and averages of historical market data, I believe the right answer is not to use *either* 6-month historical betas or historical betas with longer horizons, but to consider *both*. For this reason, I have created my hybrid betas, which take into consideration 6-month, 2-year, and 5-year historical betas along with forward-looking, option-implied betas.

Q. DO YOU THINK IT IS A GOOD IDEA TO RELY ON 6-MONTH HISTORICAL BETAS DESPITE MARKET DEVELOPMENTS IN THE PAST YEAR THAT SOME WOULD CALL “MARKET DISLOCATIONS?”

A. Financial markets are constantly in flux due to the influence of countless factors. What some people may refer to as “market dislocations,” though arguably more significant, I would say are just some of the numerous factors that are constantly affecting markets. To attempt to separate any one specific factor from “real” underlying market dynamics would be an exercise in futility.

Furthermore, it is very difficult if not impossible for anyone to predict how long any one influencing factor will be present or how long its effects will be felt by financial markets. When interest rates came down to historical lows in 2008, many analysts referred to it as an aberration that would be short-lived. Twelve years later, rates have not only remained low, but have come down even further due to yet another unexpected event. COVID-19 affected markets tumultuously, and though the initial wall of the tsunami has passed, no one can say for sure if its direct fallout and the effects of its reverberations or a resurgence will continue to affect financial markets for months or years to come.

So, in response, yes, I think it is a good idea to use 6-month historical betas to measure recent and current market dynamics regardless of recent developments. I use them as part of my hybrid betas in conjunction with longer-term historical betas and forward-looking, option-implied betas to achieve the most reasonable result.

Speaking specifically about the most significant initial impact caused of the onset of the COVID-19 pandemic in March 2020, it should be pointed out that 6-month betas calculated in the past 3 months no longer cover that period of time.

Q. GIVEN THE SHORTER PERIOD COVERED BY 6-MONTH HISTORICAL BETAS, CAN THEY STILL BE CONSIDERED STATISTICALLY SIGNIFICANT? HOW MANY DATA POINT PAIRS ARE USED IN THE CALCULATION OF YOUR 6-MONTH HISTORICAL BETA COEFFICIENTS?

A. A 6-month historical beta based on weekly returns calculated weekly is calculated using 26 closing price points for a company and for its corresponding market index, in this case the S&P 500 Index. This translates into 25 pairs of return data that are then used in the regression analysis. This is most certainly enough data to achieve statistical significance as addressed further below.

Furthermore, as stated above, the recent improvement in my calculation of historical betas of using weekly returns on every day of the week as opposed to using only one day of the week, as Value Line does, has the added benefit of providing significantly more data pairs to be used in the regression analysis used to calculate beta. For 6-month historical betas, instead of relying on 25 return pairs, the regression is performed on 117 return pairs.

Q. HOW MANY DATA POINT PAIRS ARE NECESSARY TO ESTABLISH A STATISTICALLY SIGNIFICANT CORRELATION BETWEEN TWO VARIABLES IN A REGRESSION ANALYSIS, SUCH AS THE ONE USED TO ESTABLISH BETA COEFFICIENTS?

A. Establishing a minimum number is somewhat subjective, though various authorities on statistics argue the number is between 3 and 8 data pairs. While one can broadly correctly generalize that the more data point pairs one uses, the more certain one can be about the significance of the results of any correlation analysis, this is very different from stating that one cannot achieve statistical significance with a relatively low number of data pairs. In fact, it is important to realize that one can achieve statistical significance with less than 10 data pairs, and that even hundreds of data pairs do not guarantee statistical significance. For precisely this reason, statisticians have developed a tool that helps determine statistical significance based on the number of data pairs in a regression analysis.

A "table of critical values" of Pearson's correlation, which can be readily found online[56] or in most statistics books, tells a statistician that for 25 data point pairs (implying N-2=23 "degrees of freedom"), a correlation, or beta, coefficient of 0.505 or higher will occur *by chance* with a probability of only 0.01.[57] As explained in more detail in the text regarding how to use the table of critical values,[58] any beta coefficient above this level, and certainly above the 0.687 3-month average for the recent 6-month betas for my RFC Water Proxy Group, by definition are considered statistically significant. The threshold for statistical significance for 117 data point pairs (implying 115 "degrees of freedom"), is so low that it is not even included in the table of critical values. The maximum "degrees of freedom" listed is 100, with an already very low threshold of 0.254.

Q. PLEASE EXPLAIN HOW YOU CALCULATED OPTION-IMPLIED BETAS.

A. Calculating option-implied betas of a company requires (1) obtaining stock option data for that company and a market index, (2) filtering the stock option data, (3) calculating the option-implied volatility for the company and for the index, (4) calculating the option-implied skewness for the company and for the index, and (5) calculating option-implied betas for the company based on implied volatility and skewness for the company and for the index. There are various ways one could choose to perform the steps above, but I chose to filter stock option data and calculate option-implied volatility[59] and skewness[60] following exactly the same methodology used by the Chicago Board of Options Exchange

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[56] E.g., https://researchbasics.education.uconn.edu/r_critical_value_table/#

[57] In fact, many researchers use a more lenient "alpha level" of 0.05 for determinations of statistical significance.

[58] https://researchbasics.education.uconn.edu/statistical_significance/

[59] CBOE Volatility Index White Paper, 2018. Please note that the cover page says, "proprietary information." However, this document has been in the public domain for over 3 years.

[60] The CBOE SKEW Index, 2010. Please note that the cover page says, "proprietary information." However, this document has been in the public domain for over 3 years.

(CBOE) in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

I start my process with publicly available trading information for all the options for a given security (company or index) for a complete trading day. I then filter the option data as described by the CBOE using the following guidelines:

1. Use the mid-quote or mark (average of bid and ask) as the option price.
2. Use only out-of-the-money call and put options.
    - Determine the "moneyness" threshold where absolute difference between call and put prices is smallest (using CBOE "Forward Index Price" formula).
    - Include "at-the-money" call and put options and use average of call and put prices as price for "blended" option.
3. Exclude all zero bids.
4. Exclude remaining (more out-of-the-money) options when two sequential zero bids are found.

I then apply the series of formulas clearly described in both of the CBOE's white papers to the remaining options to calculate Option-Implied Volatility and Option-Implied Skewness. In the words of the CBOE, each of its two indices is "an amalgam of the information reflected in the prices of all of the selected options." To be clear, Implied Volatility is not exactly the same as the VIX Index, and Implied Skewness is not exactly the same as the SKEW Index, but both indices are directly based on their corresponding statistical value.

Option-Implied Volatility reflects investors' expectations regarding future stock price movements. Option-Implied Skewness reflects investors' expectations regarding how implied volatility changes for strike prices that are closer and further to the current value of the underlying stock price.

The CBOE calculates Times to Expiration by the minute—as do I. The Time to Expiration of traded options cannot be changed and varies from day to day. For the sake of consistency, the CBOE calculates the VIX and SKEW indices on a "30-day" basis by interpolating for two sets of options with Times to Expiration closest to the 30-day mark. I prefer to focus on as long of a time horizon as possible for forecasting purposes. Option Times to Expiration vary significantly for various stocks but can relatively consistently be found to go out to 6 months (180 days) for utility companies. Therefore, for the sake of consistency, I have chosen to interpolate to calculate 6-month volatility and skewness where possible. Occasionally, Times to Expiration for a given stock do not go out to 180 days. If the greatest Time to Expiration available is 171 days (95%) or greater, I use the volatility and skewness for that group of options as a proxy for the 180-day volatility and skewness, respectively.

Finally, once I have calculated the option-implied volatility and skewness for each company and index using the methodology described above, I calculate option-implied betas using the following formula developed by Christoffersen, Chang, Jacobs and Vainberg (2011): [61]

$$\beta_i = \left(\frac{SKEW_i}{SKEW_m}\right)^{1/3} \left(\frac{VAR_i}{VAR_m}\right)^{1/2}$$

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[61] Bo-Young Chang & Peter Christoffersen & Kris Jacobs & Gregory Vainberg. (2011) Option-Implied Measures of Equity Risk, *Review of Finance* 16: 385-428.

Where:

β_i: $option - implied\ beta\ of\ security\ (e.g. stock, fund)$;
$SKEW_i$: $skewness\ of\ security$;
$SKEW_m$: $skewness\ of\ overall\ market\ (S\&P\ 500)$;
VAR_i: $variance\ of\ company$;
VAR_m: $variance\ of\ overall\ market\ (S\&P\ 500)$.

Q. YOU CALCULATE YOUR OPTION-IMPLIED BETAS BASED ON A 6-MONTH HORIZON. WOULD IT NOT BE BETTER TO USE A LONGER FORECASTING HORIZON?

A. The methodology I use to calculate my option-implied betas "allows for the computation of a complete term structure of beta for each company so long as the options data are available,"[62] so there is nothing inherent in the methodology that limits it to a certain time horizon.

For many applications, including cost of capital, one could argue that the longer the time horizon for the option-implied betas, the better. However, the limitation on the forecasting horizon is always set by the longest expiration period of the options currently traded in the market. Some companies trade options with expiration periods up to 2 or 3 years into the future. As evidenced by the exhaustive option data in my working papers, the maximum expiration period for the options of the companies in my RFC Water Proxy Group is approximately 8 months.[63] New options are issued roughly every 3 months for all of these companies, so the maximum expiration period on any given trading day is somewhere between 5 and 8 months. For consistency across companies in my proxy group and across dates within the 3-month period on which my analysis is focused (October through December 2021), I chose to use 6 months for the time horizon of my option-implied betas. If the maximum expiration period for the options of a given company on a given day is less than 6 months, I use the maximum expiration period as an approximation for the target 6-month horizon.

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[62] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, *Forward-Looking Betas*, April 25, 2008, Page 24.

[63] In November 2021, options for American Water Works stock with an expiration period of roughly 13 months were introduced into the market.

Simply because some may argue that it may be preferable to use longer time horizons in place of or in addition to a 6-month horizon, it does not mean that a 6-month option-implied beta is of no relevance or cannot be used. That would be tantamount to saying you cannot use a 1-year Value Line Earnings Per Share estimate, or that the minimum relevant forecast is 2 or 3 years. In fact, for purposes of option-implied betas, it would be difficult to say if a time horizon of 1 year, for instance, is necessarily always better than a time horizon of 6 months. An option-implied forward-looking beta, even with a time horizon of less than 6 months, is still a useful tool in interpreting the current expectations of investors at any given time.

A final strong argument in support of using 6-month option-implied betas in a cost of capital calculation looking years into the future is that, as expanded upon on page 80, the authors of the paper on which I based my option-implied betas concluded that their predictive powers are not limited to 6 months into the future. In fact, they conclude that 6-month option-implied betas have stronger predictive power than 6-month, 1-year, or 5-year historical betas when attempting to forecast betas 1 or 2 years into the future.

Q. WHY DIDN'T YOU USE LONG-TERM EQUITY ANTICIPATION SECURITIES, WHICH ARE OPTIONS CONTRACTS WITH AN EXPIRATION DATE OF TYPICALLY MORE THAN 1 YEAR?

A. It is not possible to use Long-Term Equity Anticipation Securities (LEAPS) to calculate option-implied betas for all utility companies because these contracts are not traded for many of them. As stated above, the maximum expiration period for the options of the 7 companies in my RFC Water Proxy Group is approximately 8 months, and so for consistency across companies and dates, I chose to use 6 months for the time horizon of my option-implied betas. As explained above, option-implied betas calculated from options contracts with expiration periods less than 1 year, in my case 6 months, are still a useful tool in interpreting investors' current expectations and are superior to the historical betas. As a further note, I use LEAPS in my CAPM when the data is available. The risk premium portion of my CAPM is based on options contracts with expiration periods exceeding 1 year, and as far out as 36 months.

Q. HOW DID YOU DECIDE ON THE RELATIVE WEIGHTS YOU ALLOCATE TO EACH COMPONENT OF YOUR HYBRID BETAS? IS THERE ANY ACADEMIC SUPPORT FOR YOUR APPROACH?

A. I am not aware of any academic study specifically focused on the optimal relative weight of historical betas to predict future betas. However, the authors of the paper I relied upon for guidance on the calculation of my option-implied betas did attempt to quantify the predictive power of 6-month option-implied ("forward-looking") betas as well as that of 6-month ("180-day"), 1-year, and 5-year historical betas by back-testing historical predictions with actual *ex post* results, or "realized" betas, for the 30 companies in the Dow

Jones Index. In addition to using each of the betas above independently, they also measured the predictive power of a "mixed" beta consisting of a simple average of the six-month option-implied beta and the 6-month historical beta.

Their conclusions for predicting 6-month future betas are as follows:

> The forward-looking beta outperforms the other methods ten times, and the same is true for the 180-day historical beta. The mixed beta is the best performer in seven cases, and the 1-year historical beta in three cases. The 5-year historical beta is always outperformed by at least one other method, and it often ranks last. The 180-day historical beta clearly dominates the two other historical methods.[64]

Their conclusions for predicting 1-year and 2-year future betas are as follows:

> Somewhat unexpectedly, the performance of the forward-looking beta compared to that of the 180-day historical beta is much better [for the one-year prediction] than [for the six-month prediction], and this conclusion carries over to [the two-year prediction]. The mixed beta also perform [sic] well. It is perhaps not surprising that the performance of the 180-day historical beta [for the one- and two-year predictions] is poorer than [for the six-month prediction], because the horizons used in the construction of realized betas are no longer equal to 180 days. What is harder to explain is why the correlation between realized beta and forward-looking beta is in many cases higher [for the one- and two-year predictions] than [for the six-month prediction]. Finally, it is also interesting that the 1-year and 5-year historical betas do not perform well [for the one-and two-year predictions]. In summary, [for the one-year prediction] either the forward-looking beta or the mixed beta is the best performer in nineteen out of thirty cases. [For the two-year prediction], this the case twenty-two times out of thirty.[65]

Their conclusions strongly support the use of 6-month historical betas, 6-month option-implied betas, and/or an average of the two as predictors of future betas 6 months, 1 year, or 2 years into the future. They also seem to indicate that historical betas lose predictive power the longer the period that is used.

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[64] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, *Forward-Looking Betas*, April 25, 2008, Page 16.

[65] Peter Christoffersen, Kris Jacobs, and Gregory Vainberg, *Forward-Looking Betas*, April 25, 2008, Page 17.

I decided on the composition of my hybrid betas primarily based on the conclusions of the authors above. A mixed or hybrid beta made up of 50% historical betas and 50% forward-looking option-implied betas seemed to be the best way to go. Though the predictive power of longer-term historical betas seems to be quite reduced, it is not zero, so in an effort to preserve the effect of longer-term market trends in my hybrid betas, I chose to further subdivide the historical component into 50% (25% of the hybrid) for the stronger predicting 6-month historical betas, 30% (15% of the hybrid) for the 2-year historical betas, and 20% (10% of the hybrid) for the 5-year historical betas.

Market Risk Premium

Q. PLEASE EXPLAIN HOW YOU CALCULATED THE EQUITY RISK PREMIUM USED IN YOUR CAPM.

A. Traditionally, the risk premium used in CAPM calculations is derived from historical returns and/or equity analyst projections. The former approach is historically accurate but does not take into account investors' expectations for future market risks and returns. The latter approach is based on analyst projections, which are not market-based and do not reflect current investor expectations. A superior market-based way to calculate the equity risk premium is to use option-implied return expectations, which is the approach I have used.

My equity risk premium is the expected return on the S&P 500 minus the risk-free rate. I calculate an expected return on the S&P 500 by using stock options traded on this index. To begin with, I use exactly the same methodology used by the Chicago Board of Options Exchange to filter stock option data and calculate option-implied volatility and skewness,[66] as described in detail in the Beta section on page 74. The volatility and skewness calculated in this way describe a probability function representing the possible trajectories for the S&P 500 implied by the options market. The resulting skewed probability function can be closely approximated by a log-normal function using established statistical formulas, which then make it straightforward to calculate the expected growth for the S&P 500 for any given cumulative probability. A cumulative probability of 50% represents the median of the probability distribution, or the option-implied market consensus, which is how I arrive at my calculation of expected market growth.

Once the option-implied growth rate of the S&P 500 has been estimated as described above, I add the dividend yield and subtract the risk-free rate to arrive at the market risk premium, as laid out in Exhibit ALR-4, page 4 and Exhibit ALR-4, page 6. In line with my Spot and Weighted Average CAPM approaches, I use both spot values as of December 31, 2021 and weighted averages over the 3 months ending on that date for option-implied growth, dividend yields, and short- and long-term risk-free rates in these calculations to arrive at a total of 4 estimated values for the market risk premium. The market risk premium I use in my Weighted Average CAPM analysis with short- and long-term risk-free rates is 9.75% and 7.94%, respectively. The market risk premium I use in my Spot CAPM analysis with short- and long-term risk-free rates is 10.35% and 8.51%, respectively.

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[66] As used in the calculation of their widely-used VIX (or Volatility Index) and SKEW Index, respectively.

Q. DID YOU TAKE INTO CONSIDERATION THE DIFFERENCE IN VOLATILITIES ACROSS EXPIRATION PERIODS IN THE OPTIONS TRADED ON THE S&P 500?

A. Yes. The volatility implied by the options market changes over time as investors' perception of risk changes. For example, during a crisis, implied volatility generally increases as investors expect that stock market prices have a greater chance of large swings compared to times when there is no crisis. As discussed earlier, investors also often have different volatility expectations over different time periods. For example, on any given day, investors might expect volatility to be relatively high over the next 30 days and to decrease over the next year or longer. The same holds true for skewness, even though it is less intuitive to understand changes in skewness than in volatility. Because of these changes across option expiration periods, I take a weighted average of the entire term structure of the option-implied volatility and skewness, which for the S&P 500 typically goes out to 24 to 36 months, interpolating where necessary, and giving the most weight to the option expiration period of 12 months.

Q. WHICH CUMULATIVE PROBABILITY DID YOU USE TO ESTIMATE THE OPTION-IMPLIED GROWTH OF THE S&P 500 IN THE CALCULATION OF YOUR MARKET RISK PREMIUM AND WHY?

A. I used a cumulative probability of 50.0% in the calculation of my option-implied growth for the S&P 500, which results in a value of 9.14% as of December 31, 2021 and a value of 8.53% for the weighted average of the 3 months ending on that date. As stated above, a cumulative probability of 50% represents the median of the probability distribution, or in this case the option-implied market consensus, which is why I have chosen to use this level.

As a matter of fact, using the same probability distribution derived from the options market described above, one can also calculate the cumulative probability implied by a given cost of capital. For instance, using the same risk-free rates and betas in my CAPM analysis, CAWC's requested ROE of 10.75% implies an average market risk premium of 13.2%, an average overall market return of 14.1%, average growth for the S&P 500 of 12.9%, and a cumulative probability of 60.3%. In other words, to achieve the required market growth of 12.9%, reality would have to exceed 60.3% of the scenarios investors currently see as plausible for the market in aggregate, considerably more than the median market consensus at 50%. To put this into perspective, it is important to note that values on the tails of the probability function get increasingly separated, requiring an ever-increasing growth rate for every additional percentage in the cumulative probability, and making it impossible to ever arrive at 100%.

Using exactly the same methodology, my 7.52% recommended ROE for CAWC implies an average market risk premium of 8.8%, an average overall market return of 9.8%, average growth for the S&P 500 of 8.5%, and a cumulative probability of 50.0%.

Similarly for CWSC, the company's requested ROE of 10.35% implies an average market risk premium of 12.6%, an average overall market return of 13.6%, average growth for the S&P 500 of 12.3%, and a cumulative probability of 58.9%. In contrast, my 7.81% recommended ROE for CWSC implies an average market risk premium of 9.2%, an average overall market return of 10.2%, average growth for the S&P 500 of 8.9%, and a cumulative probability of 50.9%.

For GSWC, the company's requested ROE of 10.50% implies an average market risk premium of 12.8%, an average overall market return of 13.8%, average growth for the

S&P 500 of 12.5%, and a cumulative probability of 59.4%. In contrast, my 7.51% recommended ROE for GSWC implies an average market risk premium of 8.8%, an average overall market return of 9.8%, average growth for the S&P 500 of 8.5%, and a cumulative probability of 49.9%.

For SJWC, the company's requested ROE of 10.30% implies an average market risk premium of 12.6%, an average overall market return of 13.5%, average growth for the S&P 500 of 12.2%, and a cumulative probability of 58.7%. In contrast, my 7.65% recommended ROE for SJWC implies an average market risk premium of 9.0%, an average overall market return of 10.0%, average growth for the S&P 500 of 8.7%, and a cumulative probability of 50.4%.

Q. ARE THE CUMULATIVE PROBABILITIES YOU REFER TO IN THIS CASE DIRECTLY COMPARABLE TO THE CUMULATIVE PROBABILITIES YOU HAVE USED OR REFERRED TO IN PRIOR TESTIMONIES YOU HAVE FILED?

A. In late 2020, after significant efforts related to the complexities in processing extremely large volumes of option data, I was finally able to use option-implied volatility and option-implied skewness to come up with a log-normal function that approximates the probability distribution of the possible trajectories for the S&P 500 implied by the options market as of any given day, as explained above. All of the testimonies I have filed since then, starting in 2021, have used this complete and superior approach along with a cumulative probability of 50%, representing the median of the probability distribution, or the option-implied market consensus, to estimate expected market growth. Any references to cumulative probability in these testimonies are directly comparable.

Prior to incorporating skewness into the approximation, I used a normal function to estimate the same probability distribution referred to above. Using a normal distribution as an approximation is a simplification used commonly in economics, including in the Black-Scholes formula for a single option. However, unlike a skewed log-normal function, a normal function has the same median and mean, meaning that when applied in this case, the option-implied market consensus of this simplified approximation implies market growth of 0%. As a result, before using log-normal functions, I had to resort to finding an adequate level of cumulative probability above 50% to estimate market growth, which is admittedly somewhat subjective. To be conservative, I often used a cumulative probability of 68.3%, which is the probability found within one standard deviation of the mean of a normal distribution, which I understood would lead to a conservatively high estimate for market growth. It is important to point out that the cumulative probabilities of the simplified normal function approximation I used in cases before 2021 cannot be directly compared to the cumulative probabilities of the superior log-normal function approximation, which takes skewness into account. The considerably improved approximation based on a log-normal function eliminates all subjectivity in arriving at the implied market consensus and allows a much better measure of implied cumulative probabilities of deviations from that market consensus.

CAPM Results

Q. PLEASE SUMMARIZE THE RESULTS OF YOUR CAPM.

A. Table 10 and Table 11 on page 87 show the results of my Weighted Average CAPM and Spot CAPM Analyses, respectively.

Weighted Average CAPM

TABLE 10: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY
WEIGHTED - All Inputs Weighted From October to December 2021

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.05%	0.05%	1.87%	1.87%
Beta	0.73	0.72	0.73	0.72
Risk Premium	9.75%	9.75%	7.94%	7.94%
CAPM	7.17%	7.03%	7.66%	7.55%

Source: Exhibit ALR-4, page 1

Spot CAPM

TABLE 11: CAPITAL ASSET PRICING MODEL (CAPM) - INDICATED COST OF EQUITY (SPOT)
SPOT - All Inputs Based on Last Available Data as of December 31, 2021

	3-Month Treasury Bill		30-Year Treasury Bond	
	Hybrid Beta	Forward Beta	Hybrid Beta	Forward Beta
Risk-Free Rate	0.06%	0.06%	1.90%	1.90%
Beta	0.75	0.78	0.75	0.78
Risk Premium	10.35%	10.35%	8.51%	8.51%
CAPM	7.82%	8.08%	8.28%	8.50%

Source: Exhibit ALR-4, page 5

V. EVALUATION OF THE CCAWCS' RATE OF RETURN TESTIMONY

Q. PLEASE SUMMARIZE THE RATE OF RETURN TESTIMONIES OF THE CCAWCS' WITNESSES.

A. The witnesses testifying on behalf of the CCAWCs provided ROE recommendations of between 9.75% and 10.75%.[67] They arrived at their recommendations based on numerous methods including their own versions of the DCF, Risk Premium analyses, CAPM/ECAPM, Implied Equity Risk Premium and Comparable Earnings approaches. The Companies' witnesses define the cost of equity or COE as market-based or established using market data. Dr. Villadsen (CAWC) defines the COE as "the rate of return that capital markets would require for an equity investment in California-American Water."[68] Mr. Sheilendranath (CWSC) defines the cost of capital as "the rate of return investors require based on the risk-return alternatives available in competitive capital markets..[69] Dr. Hunt (GSWC) states "because market data are not available for Golden State Water, we must rely on data for alternative investments to estimate GSW's cost of equity."[70] Ms. Bulkley (SJWC) states "the ROE is a market-based concept".[71]

However, the ROE recommendations of the four water Companies' witnesses cannot be considered market-based. For example, they recommend using forecasted long-term government bond interest rates in their CAPM analyses instead of using market data to measure investors interest rate expectations directly. They ask for firm specific risk adjustments, in most cases, without the required market-based justification.[72] Dr. Villadsen claims that the multi-stage DCF model "should be granted limited weight at this time" because, among other reasons, historically high utility stock prices have resulted in downward biased dividend yields.[73] Ms. Bulkley uses similar logic to Dr. Villadsen to conclude that high utility stock prices distort DCF model results. Ms. Bulkley states "the DCF model results must be interpreted with extreme caution."[74] When stock prices increase, all else equal, the cost of equity will decrease. For Dr. Villadsen to claim the multi-stage DCF model should be given little weight because utility stock prices are high is revealing in terms of her reluctance to recommend a market-based cost of equity. As discussed below, the ROE recommendations of the four witnesses testifying on behalf of the CCAWCs are above the market-based cost of equity and if used to set rates would result in overcharging consumers.

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[67] Dr. Villadsen's direct testimony, Page 2, lines 33-35, Mr. Sheilendranath's Direct Testimony, Page 2, line 14, Dr. Hunt's Direct Testimony, Page 4, lines 13-14, Ms. Bulkley's Direct Testimony, Page 6, lines 10-13.

[68] Dr. Villadsen's direct testimony, Page 2, lines 30-30-33.

[69] Mr. Sheilendranath's Direct Testimony, Page 7, lines 21-22.

[70] Dr. Hunt's Direct Testimony, Page 7, footnote 4.

[71] Ms. Bulkley's Direct Testimony, Page 25, lines 22-26.

A. California American Water Company

Q. PLEASE SUMMARIZE THE TESTIMONY OF DR. VILLADSEN.

A. Dr. Villadsen recommended that CAWC be allowed an ROE of 10.75%, which is the ROE being requested by CAWC.[75] Dr. Villadsen arrived at her recommendation based upon her own modified versions of the following COE models: 1) two DCF (Single- and Multi-

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[72] Dr. Hunt uses market data (the stock price movements GSWC's parent company) in an "event study" to justify his claim GSWC's cost of equity was impacted by the pending elimination of the WRAM. Dr. Hunt's analysis is market-based in that it is based on equity price movements, but it is flawed because it does not address if and to what degree the pending elimination of the WRAM continues to impact investors' risk and return expectations. Additionally, he chose not to use market data to evaluate most of his other claims regarding GSWC's relative risk.

[73] Dr. Villadsen's Direct Testimony, Page 43, lines 870-872 and Page 43, lines 882-888.

[74] Ms. Bulkley's Direct Testimony, Page 20, lines 11-16 and Page 21, lines 1-7.

[75] Dr. Villadsen's Direct Testimony, Page 6, Lines 145-146.

Stage) models, 2) CAPM, 3) ECAPM, and 4) Implied Equity Risk Premium Model.[76] However, her 10.75% recommendation is not based on her model results alone. As outlined in Table 12 on page 91, the results of her COE models range between 6.10% and 8.97% (averaging 8.25%), far below her 10.75% ROE recommendation. She claims it is necessary to add a so-called leverage adjustment to account for the difference between market value and book value capital structures.[77] This adjustment increases her model results from the range shown in Table 12 to between 9.75% and 11.00%.[78] Dr. Villadsen further states that a reasonable ROE for CAWC "should fall towards the upper end of the range for the sample" due to, among other reasons: 1) current economic/financial market conditions (e.g., low interest rates, high price earnings ratios), 2) CAWC's relatively high financial risk compared to other water utility companies, and 3) CAWC's unique and asymmetric business risks.[79]

The results in Table 12 exclude the 9.7% result of her so-called Implied Equity Risk Premium method. As explained below, this method must be excluded from consideration because it is not market-based.

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[76] Dr. Villadsen's Direct Testimony, Page 60, Figure 21; Page 45, Figure 14.

[77] Dr. Villadsen's Direct Testimony, Pages 59-60, Lines 1,214-1,218.

[78] Dr. Villadsen's Direct Testimony, Page 2, Lines 44-45.

[79] Dr. Villadsen's Direct Testimony, Page 6, Lines 138-146.

TABLE 12: DR. VILLADSEN'S COST OF EQUITY RESULTS - CORE SAMPLE *Excluding Implied Equity Risk Premium Model and Financial Risk Adjustments*	
METHOD	**Model Results**
DCF - Single-stage [1]	8.51%
DCF - Multi-stage [2]	6.10%
CAPM	
RP of 7.25% [3]	8.46%
RP of 7.53% [4]	8.77%
ECAPM	
RP of 7.25% [3]	8.67%
RP of 7.53% [4]	8.97%
Dr. Villadsen's Average Cost of Equity Model Results	**8.25%**

[1] Dr. Villadsen's Direct Testimony, Schedule BV-6, Panel A
[2] Dr. Villadsen's Direct Testimony, Schedule BV-6, Panel B
[3] Dr. Villadsen's Direct Testimony, Schedule BV-10, Panel A
[4] Dr. Villadsen's Direct Testimony, Schedule BV-10, Panel B

The unadjusted results of Dr. Villadsen's COE models are still higher than CAWC's market-based cost of equity because of flaws in her application of those models, as discussed below.

Q. WHY IS IT INAPPROPIRATE TO CONSIDER DR. VILLADSEN'S LEVERAGE ADJUSTMENTS IN DETERMINING CAWC'S AUTHORIZED ROE?

A. Financial leverage is a measure of the ratio of debt financing to equity financing. As a company takes on more debt, its financial risk increases because the higher the leverage, the higher the chance of financial stress and bankruptcy. Leverage is a concept that a Chief Financial Officer needs to consider when making sure the company's cost of equity calculations match its targeted capital structure. It is appropriate to consider financial leverage in general, as I do in my testimony. However, Dr. Villadsen's leverage adjustment in this proceeding has nothing to do with finance. She is using complex financial concepts (e.g., after-tax weighted-average cost of capital) to distort the fundamental mechanics of original cost ratemaking. Applying a market-based cost of equity to book value is the very definition of original cost ratemaking, but not a reason to make a leverage adjustment. Therefore, the financial leverage adjustment proposed by Dr. Villadsen is simply misplaced and should be removed from consideration in this proceeding.

Q. DOES DR. VILLADSEN CLAIM THERE ARE ADDITIONAL RISK FACTORS THAT APPLY TO CAWC?

A. Dr. Villadsen claims that the following "asymmetric" risk factors "point to a higher than average ROE"[80] for CAWC: 1) CAWC's location in drought-plagued California, 2) unique assets that earn less than the average cost of capital, and 3) higher-than-average "capital intensity."[81] Additionally, she claims that CAWC will face the risk of variability in water consumption in 2023 when it is set to lose its WRAM. Dr. Villadsen has not demonstrated that CAWC has greater non-diversifiable risk on average than other water utility companies, therefore there is no reason for it to receive an authorized ROE in the upper end of COE model results. CAWC should receive an authorized ROE no higher than the midpoint of properly applied model results.

Q. IS DR. VILLADSEN'S 10.75% COST OF EQUITY RECOMMENDATION MARKET-BASED?

A. No. Dr. Villadsen correctly states that "The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk."[82] She also correctly states that "[her] approach to estimating the cost of equity for California American Water focuses on measuring the expected returns required by investors…"[83]

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[80] Dr. Villadsen's Direct Testimony, Page 57, Lines 1150-1159.
[81] Dr. Villadsen's Direct Testimony, Page 4, Lines 78-83.
[82] Dr. Villadsen's Direct Testimony, Page 7, Lines 159-160.
[83] Dr. Villadsen's Direct Testimony, Page 5, Lines 114-117.

However, when it comes time to make her computations, she fails to rely on the return expectations of investors as indicated by market data. Instead, she uses the expectations of economists, equity analysts, and other non-market expectations, even where market data is readily available. In other words, her cost of equity recommendation is inconsistent with the requirement of the U.S. Supreme Court that the cost of equity should be market-based.

Q. DO THE RESULTS OF DR. VILLADSEN'S COST OF EQUITY MODELS PROVIDE A RELIABLE INDICATION OF CAWC'S COST OF EQUITY?

A. No. As discussed above, even the 8.25% midpoint of Dr. Villadsen's unadjusted model results is inflated because her models are based on non-market-based methodology that violates the purpose of rate of return regulation. Additionally, each of her COE models has specific issues that contribute to her unreasonably high results. First, I will address how her constant growth DCF method is unreliable because it mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth. A company cannot invest and grow with money it has paid out to investors as a dividend. Second, I will explain why the most significant flaw with Dr. Villadsen's multi-stage DCF methodology is her claim that its 6.1% result is not reliable in today's capital markets.[84] Third, I will explain how her CAPM/ECAPM methodologies overstate the cost of equity. Finally, I will explain why her so-called Implied Risk Premium method should be disregarded because it is not a market-based method.

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[84] To be conservative, I have excluded my non-constant growth DCF results from my COE recommendations because some of the results are below current debt cost rates for water utilities. However, with such high utility stock prices, low DCF results make financial sense and support the reliability of the DCF model.

Constant Growth DCF Method

Q. DOES DR. VILLADSEN PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Dr. Villadsen correctly explains that "The Gordon Growth / single-stage DCF models require forecast growth rates that reflect investor expectations about the pattern of dividend growth for the companies over a sufficiently long horizon…"[85] Her constant growth DCF method contradicts her own description of how the constant growth model should be implemented, however. Her growth rate component is based entirely on short-term EPS growth forecasts.[86] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used be derived from a careful study of the future *sustainable* growth in cash flow anticipated by investors. As discussed in Section II on page 4, major financial institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates, as Dr. Villadsen has done.

Q. CAN YOU PLEASE SUMMARIZE WHY A FUTURE-ORIENTED "B X R" METHOD IS SUPERIOR TO A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE FORECAST IN PROVIDING A LONG-TERM SUSTAINABLE GROWTH RATE?

A. The primary cause of sustainable earnings growth is the retention of earnings. A company is able to create higher future earnings by retaining a portion of the prior year's earnings in the business and purchasing new business assets with those retained earnings. There are many factors that can cause short-term swings in earnings growth rates, but the long-term sustainable growth is caused by retaining earnings and reinvesting those earnings. Factors that cause short-term swings include anything that causes a company to earn a return on book equity at a rate different from the long-term sustainable rate. Assume, for example, that a particular utility company is regulated so that it is provided with a reasonable opportunity to earn 9% on its equity. Should the company experience an event such as the loss of several key customers, or unfavorable weather conditions, which cause it to earn only 6% on equity in a given year, the drop from a 9% earned return on equity to a 6% earned return on equity would be concurrent with a very large drop in earnings per share. In fact, if a company did not issue any new shares of stock during the year, a drop from a 9% earned return on book equity to a 6% earned return on book equity would result in a 33.3% decline in earnings per share over the period.[87] However, such a drop in earnings would not be an indication of what is a long-term sustainable earnings per share growth rate. If the drop were caused by weather conditions, the drop in earnings would be immediately offset once normal weather conditions return. If the drop were from the loss of some key customers, the company would replace the lost earnings by filing for a rate increase to bring revenues up to the level required for the company to be given a reasonable opportunity to recover its cost of equity.

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[85] Dr. Villadsen's Direct Testimony, Page 43, Lines 875-877.
[86] Dr. Villadsen's Direct Testimony, Schedule No. BV-5.

For the reasons above, changes in earnings per share growth rates that are caused by non-recurring changes in the earned return on book equity are inconsistent with long-term sustainable growth, but changes in earnings per share because of the reinvestment of additional assets is a cause of sustainable earnings growth. The “b x r” term in the DCF equation computes sustainable growth because it measures only the growth which a company can expect to achieve when its earned return on book equity "r" remains in equilibrium. If analysts have sufficient data to be able to forecast varying values of "r" in future years, then a complex, or multi-stage DCF method must be used to accurately quantify the effect. Averaging growth rates over sub-periods, such as averaging growth over the first five years with a growth rate expected over the subsequent period, will not provide an appropriate representation of the cash flows expected by investors in the future and, therefore, will not provide an acceptable method of quantifying the cost of equity using the DCF method. The choices are either a constant growth DCF, in which one growth rate derived using "b x r" should be used, or a complex DCF method in which the cash flow anticipated in each future year is separately estimated. Dr. Hunt has done neither. Instead, he mechanically adds analysts' five-year earnings per share growth rate to the dividend yield which overstates the cost of equity.

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[87] By definition, earned return on equity is earnings divided by book value. Therefore, whatever level of earnings is required to produce earnings of 6% of book would have to be 33.3% lower than the level of earnings required to produce a return on book equity of 9%.

Q. WHY ARE ANALYSTS' FIVE-YEAR CONSENSUS GROWTH RATES NOT INDICATIVE OF LONG-TERM SUSTAINABLE GROWTH RATES?

A. Analysts' five-year earnings per share growth rates are earnings per share growth rates that measure earnings growth from the most currently completed fiscal year to projected earnings five years into the future. These growth rates are not indicative of future sustainable growth rates in part because the sources of cash flow to an investor are dividends and stock price appreciation. While both stock price and dividends are impacted in the long run by the level of earnings a company is capable of achieving, earnings growth over a period as short as five years is rarely in synchronization with the cash flow growth from increases in dividends and stock prices. For example, if a company experiences a year in which investors perceive that earnings temporarily dipped below normal trend levels, stock prices generally do not decline at the same percentage that earnings decline, and dividends are usually not cut just because of a temporary decline in a company's earnings. Unless both the stock price and dividends mirror every down swing in earnings, they cannot be expected to recover at the same growth rate that earnings recover. Therefore, growth rates such as five-year projected growth in earnings per share are not indicative of long-term sustainable growth rates in cash flow. As a result, they are not applicable for direct use in the simplified DCF method.

Q. IS THE USE OF FIVE-YEAR EARNINGS PER SHARE GROWTH RATES IN THE DCF MODEL ALSO IMPROPER?

A. Yes. A raw, unadjusted, five-year earnings per share growth rate is usually a poor proxy for either short-term or long-term cash flow growth that an investor expects to receive. When implementing the DCF method, the time value of money is considered by equating the current stock price of a company to the present value of the future cash flows that an investor expects to receive over the entire time that he or she owns the stock. The discount rate required to make the future cash flow stream, on a net present value basis, equal to the current stock price is the cost of equity. The only two sources of cash flow to an investor are dividends and the net proceeds from the sale of stock at whatever time in the future the investor finally sells. Therefore, the DCF method is discounting future cash flows that investors expect to receive from dividends and from the eventual sale of the stock. Five-year earnings growth rate forecasts are especially poor indicators of cash flow growth, even over the five years being measured by the five-year earnings per share growth rate number.

Q. WHY IS A FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATOR OF THE FIVE-YEAR CASH DIVIDEND GROWTH EXPECTATIONS?

A. The board of directors of a company changes dividend rates based upon long-term earnings expectations combined with the capital needs of a company. Most companies do not decrease dividends simply because a company has a year in which earnings were below sustainable trends, and similarly they do not increase dividends simply because earnings for one year happened to be above long-term sustainable trends. Therefore, over any given five-year period, earnings growth is frequently very different from dividend growth. In order for earnings growth to equal dividend growth, at a minimum, earnings per share in the first year of the five-year earnings growth rate period would have to be exactly on the long-term earnings trend line expected by investors. Since earnings in most years are above or below the trend line, the earnings per share growth rate over most five-year periods is different from what is expected for dividend growth.

Q. WHY IS THE FIVE-YEAR EARNINGS PER SHARE GROWTH RATE A POOR INDICATION OF FUTURE STOCK PRICE GROWTH?

A. If a company happens to experience a year in which earnings decline below what investors believe is consistent with the long-term trend, then the stock price does not drop anywhere near as much as earnings drop. Similarly, if a company happens to experience a year in which earnings are higher than the investor-perceived long-term sustainable trend, the stock price will not increase as much as the earnings. In other words, the P/E ratio of a company will increase after a year in which investors believe earnings are below sustainable levels, and the P/E ratio will decline in a year in which investors believe earnings are higher than expected. Since stock price is one of the important cash flow sources to an investor, a five-year earnings growth rate is a poor indicator of cash flow, both because it is a poor indicator of stock price growth over the five years being examined, and because it is equally a poor predictor of dividend growth over the period.

Q. ARE YOU SAYING THAT ANALYSTS' CONSENSUS EARNINGS PER SHARE GROWTH RATES ARE USELESS AS AN AID TO PROJECTING THE FUTURE?

A. No. Analysts' EPS growth rates are, however, very dangerous if used in a simplified DCF without proper interpretation. While they are not useful if used in their "raw" form, they can be very useful in computing estimates of what earned return on equity investors expect will be sustained in the future, and as such, are useful in developing long-term sustainable growth rates. This is exactly what I do in the application of my Constant Growth DCF Analysis.

Multi-Stage DCF Method

Q. DO YOU AGREE WITH DR. VILLADSEN THAT THE 6.1% RESULTS OF HER MULTI-STAGE DCF SHOULD BE GIVEN LIMITED WEIGHT AT THIS TIME?

A. No. Dr. Villadsen claims that the low results of her multi-stage DCF model should be given limited weight at this time because of the following two reasons. First, she states that a "flight to quality" has resulted in higher than usual stock prices and lower than usual dividend yields for water utility companies. Second, she claims the current GDP growth forecast is substantially below historical forecasts.

The fact that Dr. Villadsen's multi-stage DCF is lower as a result of higher stock prices is a good sign that it might be measuring the market-based cost of equity. A COE model that is not impacted by market conditions could not provide a market-based cost of equity. Apparently, Dr. Villadsen believes this influence is a problem.

Current short-term GDP forecasts are well above historical averages, so Dr. Villadsen's starting premise for her second point is questionable at best. But even if her premise were true, she doesn't explain why low GDP growth expectations should not be taken into account when estimating the cost of equity.

It should also be pointed out that Dr. Villadsen has been making similar claims that utility stock prices are unusually high and GDP growth forecasts are unusually low for years. In CAWC's 2017 rate case, Dr. Villadsen also claimed that the current high utility stock prices and unusually low GDP growth forecasts indicated that the results of her multi-stage DCF may be downward biased.[88]

CAPM / ECAPM

Q. PLEASE DESCRIBE DR. VILLADSEN'S CAPM METHOD.

A. Dr. Villadsen explains that the CAPM "posits a risk-return relationship known as the Security Market Line, in which the required expected return on an asset is proportional to the asset's relative risk as measured by that asset's so-called 'beta.'"[89] She says that this method is defined by the following formula and four components:

$$r_s = r_f + \beta\text{s X MRP}$$

Where:

r_s = the cost of capital for investment S;
r_f = the risk-free interest rate;
β = Beta risk measure for investment S; and

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[88] Application 17-04-003, Dr. Villadsen's Direct Testimony, Page 39, lines 809-816.
[89] Dr. Villadsen's Direct Testimony, Page 31, lines 635-637.

MRP = the market equity risk premium.[90]

She also uses an Empirical CAPM (ECAPM). Dr. Villadsen claims the ECAPM is necessary because research has shown that low-beta stocks tend to have higher risk premiums than predicted by the CAPM.[91] This method includes the same four components as the CAPM, but also introduces a factor of alpha (α), which "has the effect of increasing the intercept, but reducing the slope of the Security Market Line,"[92] essentially increasing the risk-free rate of the CAPM.

Dr. Villadsen's ECAPM formula:

$$K_s = r_f + \alpha + \beta s \text{ x } (MRP - \alpha)$$ [93]

Q. WHAT RISK-FREE RATE DOES DR. VILLADSEN USE IN HER CAPM/ECAPM?

A. She uses a risk-free rate of 2.8% based on the forecasted yield on 20-year U.S. Treasury Bonds.[94] The implied risk-free rate of her ECAPM is 2.8% + 1.5% = 4.3%.

Q. WHAT RISK PREMIUM DOES DR. VILLADSEN USE IN HER CAPM/ECAPM?

A. Dr. Villadsen uses a Market Risk Premium based on historical data (7.25%) and "forward-looking measures" (7.53%). Her historical MRP is based on the arithmetic average market risk premium of stocks over long-term government bonds from 1926 to the present (2020). Dr. Villadsen's forward-looking MRP is based on Bloomberg's February 2021 forecast.[95] Both of these methodologies are based on the S&P 500 Index as a benchmark for the market.

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[90] Dr. Villadsen's Direct Testimony, Page 31, lines 638-642 and page 32, lines 643-644.
[91] Dr. Villadsen's Direct Testimony, Page 35, line 720.
[92] Dr. Villadsen's Direct Testimony, Page 35, lines 723-725.
[93] Dr. Villadsen's Direct Testimony, Page 31, lines 638-642 and page 32, lines 643-644.
[94] Dr. Villadsen's Direct Testimony, Page 32, lines 663-668 and page 33, lines 669-671.
[95] Dr. Villadsen's Direct Testimony, Page 33, lines 683-687.

Q. WHAT BETA COEFFICIENT DOES DR. VILLADSEN USE IN HER CAPM/ECAPM?

A. She uses Value Line published betas, which are calculated only once every 3 months based on 5 years of historical weekly returns. The Value Line beta calculation methodology is based on the New York Stock Exchange Composite Index, which includes approximately 2,800 companies, as a benchmark for the market.[96]

Q. DOES DR. VILLADSEN USE AN APPROPRIATE RISK-FREE RATE IN HER CAPM?

A. No. The risk-free rate component of Dr. Villadsen's CAPM is not appropriate because it is based primarily on economists' published projections and not investors' expectations as indicated by current market yields. As of May 31, 2021, the yield on 20-year Treasury Bonds is 2.18%. Dr. Villadsen justifies using projected yields of 2.8%, instead of relying on current market yields, because "the cost of capital set in this proceeding will be in place over [the] three-year period 2022-2024."[97] But the current yield on long-term U.S. Treasury bonds indicates current investor expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 2.8% next year, the price of 20-year U.S. Treasury bonds would fall until the yield was about 2.8%. The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 20-year bond today expecting interest rates to increase, would be the same as giving money away. Of course, it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase from 2.18% to 2.8% any time soon.

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[96] Dr. Villadsen's Direct Testimony, Page 34, lines 706-707.

[97] Dr. Villadsen's Direct Testimony, Page 32, lines 663-666.

In CAWC's 2017 rate case, Dr. Villadsen stated that interest rates are "artificially depressed and expected to rise."[98] Long-term interest rates did not increase after she filed her testimony in 2017. Instead, interest rates have remained at historically low levels.

Q. DO DR. VILLADSEN'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Yes. The historical beta coefficients used by Dr. Villadsen are higher than a broader measure of recent historical and forward-looking beta coefficients indicate and therefore overstate the cost of equity. Dr. Villadsen's CAPM results likely overstate the cost of equity because she uses 5-year historical betas (averaging 0.78 for her Core Sample proxy group[99]) instead of betas based on current investor expectations. Dr. Villadsen herself explains that one of the disadvantages of the CAPM as compared to the DCF is that it "relies on historical data to estimate systematic risk."[100] This is the reason I rely on option-implied betas (explained on page 74) in addition to historical betas to estimate forward-looking systematic risk in the form of beta. Even though recent spot values of option-implied betas have spiked (possibly because of the onset of the Omicron variant) and come up to the average used by Dr. Villadsen, option-implied betas over the past three months average 0.72 and have been as low as 0.62, indicating that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic (the average option-implied beta for my RFC Water Proxy Group averaged 0.93 for the three months ending December 31, 2019).

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[98] Application 17-04-003, Dr. Villadsen's Direct Testimony, Page 20, lines 407-409.
[99] Dr. Villadsen's Direct Testimony, Page 29, Figure 8.
[100] Dr. Villadsen's Direct Testimony, Page 42-43, lines 851-856.

Another flaw with Dr. Villadsen's CAPM and ECAPM analyses is that she uses a different market index for her beta calculations than she uses for her market risk premium. She uses 5-year historical betas published by Value Line which are based on the NYSE Composite Index, but her market risk premium is based on the S&P 500 Index. As discussed above, the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium. Using exactly the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio – sometimes significantly different values (10 basis points or more).

Q. DO YOU AGREE WITH THE RESULTS OF DR. VILLADSEN'S CAPM/ECAPM ANALYSIS?

A. No, I do not agree with the results (8.46% - 8.97%)[101] of Dr. Villadsen's CAPM analysis because they are not based on investor expectations. My primary concern is that she uses analyst forecasts (e.g., interest rates, Bloomberg's forecasted equity returns) instead of investor expectations as revealed by market data. Dr. Villadsen's use of non-market-based data in her "forward-looking" CAPM analysis contradicts her statement that the cost of equity should rely on market-based data to quantify investor expectations. As elaborated throughout my testimony, contrary to interest rate projections, current low yields on long-term U.S. Treasury bonds indicate that investors do not expect interest rates to increase any time soon, because when interest rates increase the owner of a long-term bond will lose money.

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[101] Table 12 on page 91.

Furthermore, even though historical betas are a decent way of estimating recent non-diversifiable risk, they are inherently backward looking. Dr. Villadsen herself agrees explaining that one of the disadvantages of the CAPM as compared to the DCF is that it "relies on historical data to estimate systematic risk."[102] This is the reason I rely on option-implied betas (explained on page 74) in addition to historical betas to estimate forward-looking systematic risk in the form of beta. As explained above, current stock option data indicates that investors expect betas for water utility stocks to be lower than the 5-year historical betas relied upon by Dr. Villadsen.

Implied Equity Risk Premium Method

Q. YOU MENTIONED ABOVE THAT DR. VILLADSEN'S SO-CALLED IMPLIED EQUITY RISK PREMIUM METHOD SHOULD NOT BE CONSIDERED BECAUSE IT IS NOT MARKET-BASED. PLEASE EXPLAIN.

A. As discussed above, the foundation of Dr. Villadsen's analytical methodology is flawed because it is not market-based. But in her DCF and CAPM method she at least includes some market data (e.g., stock prices). In the case of her Implied Market Risk Premium method, she does not use any market data at all. She does not even pretend it is market based. The overriding problem with Dr. Villadsen's Implied Equity Risk Premium method is that it does not address the cost of equity at all. It simply calculates the historical relationship between authorized ROEs and interest rates. Authorized ROEs are applied to book equity and therefore, in order to determine investors' return expectations, it is required to consider the market price investors are willing to pay for the companies with these authorized ROEs.

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[102] Dr. Villadsen's Direct Testimony, Page 42-43, lines 851-856.

Q. PLEASE SUMMARIZE YOUR CONCERNS WITH DR. VILLADSEN'S RATE OF RETURN TESTIMONY.

A. I have the following primary concerns regarding the rate of return testimony of Dr. Villadsen:

1. Increasing her ROE recommendation based on her leverage adjustment calculations is inappropriate because it goes against original cost ratemaking;
2. Her claim that the 6.1% results of her multi-stage DCF are downward biased is opportunistic, non-market-based, and financially illogical;
3. Her claim that CAWC is riskier than the average company in her Core Sample proxy group is unjustified, and therefore their authorized ROE should be based on the midpoint of COE model results and not the high end, as she suggests;
4. The use of interest rate forecasts in her CAPM/ECAPM methods instead of market-based yields inflates the risk-free rate and thus overstates the cost of equity;
5. Instead of using available forward-looking measures of systematic risk, she only uses backward looking historical beta coefficients in her CAPM/ECAPM. Furthermore, these historical betas are flawed because

they are stale and based on a market index that is inconsistent with the risk premium portion of her methodology;

6. Her CAPM and ECAPM likely overstate the cost of equity because she uses a different market index for her beta calculations than she uses for her market risk premium and
7. Her Constant Growth DCF overstates the cost of equity because she mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates dividend payments, and growth.

B. California Water Service Company

Q. PLEASE SUMMARIZE THE TESTIMONY OF MR. SHEILENDRANATH.

A. Mr. Sheilendranath recommended that CWSC be allowed an ROE of 10.00% to 10.75% and CWSC is requesting a 10.35% ROE.[103] Mr. Sheilendranath arrived at his recommendation based upon his own modified versions of the following COE models: 1) two DCF (Single- and Multi-Stage) models, 2) CAPM, 3) ECAPM, and 4) Implied Equity Risk Premium Model.[104] However, his 10.00% to 10.75% recommendation is not based on his model results alone. As outlined in Table 13 on page 108, the results of his COE models range between 6.10% and 8.97% (averaging 8.25%), far below his 10.00% to 10.75% ROE recommendation. He claims it is necessary to add a so-called leverage adjustment to account for the difference between market value and book value capital structures.[105] This adjustment increases his model results from the range shown in Table 13 to between 7.3% and 11.6%.[106] Mr. Sheilendranath further states that CWSC is "above average-risk"[107] relative to the other water utility companies in his Core Sample proxy group and therefore concludes that the company's 0.00% requested ROE is "conservative."[108]

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[103] Mr. Sheilendranath's Direct Testimony, Page 56, Lines 16-17.

[104] Mr. Sheilendranath's Direct Testimony, Page 3, Table 1.

The results in Table 13 exclude the 9.7% result of his so-called Implied Equity Risk Premium method. As explained below, this method must be excluded from consideration because it is not market-based.

TABLE 13: MR. SHEILENDRANATH'S COST OF EQUITY RESULTS - CORE SAMPLE
Excluding Implied Equity Risk Premium Model and Financial Risk Adjustments

METHOD	Model Results
DCF - Single-stage [1]	8.51%
DCF - Multi-stage [2]	6.10%
CAPM	
RP of 7.25% [3]	8.46%
RP of 7.53% [4]	8.77%
ECAPM	
RP of 7.25% [3]	8.67%
RP of 7.53% [4]	8.97%
Mr. Sheilendranath's Average Cost of Equity Model Results	**8.25%**

[1] Mr. Sheilendranath's Direct Testimony, Schedule AS-6, Panel A
[2] Mr. Sheilendranath's Direct Testimony, Schedule AS-6, Panel B
[3] Mr. Sheilendranath's Direct Testimony, Schedule AS-10, Panel A
[4] Mr. Sheilendranath's Direct Testimony, Schedule AS-10, Panel B

The unadjusted results of Mr. Sheilendranath's COE models are still higher than CWSC's market-based cost of equity because of flaws in his application of those models, as discussed below.

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[105] Mr. Sheilendranath's Direct Testimony, Page 12, Lines 11-21.
[106] Mr. Sheilendranath's Direct Testimony, Page 3, Table 1.
[107] Mr. Sheilendranath's Direct Testimony, Page 6, Lines 22-23.
[108] Mr. Sheilendranath's Direct Testimony, Page 3, Lines 2-3.

Q. WHY IS IT INAPPROPIRATE TO CONSIDER MR. SHEILENDRANATH'S LEVERAGE ADJUSTMENTS IN DETERMINING CWSC'S AUTHORIZED ROE?

A. Financial leverage is a measure of the ratio of debt financing to equity financing. As a company takes on more debt, its financial risk increases because the higher the leverage, the higher the chance of financial stress and bankruptcy. Leverage is a concept that a Chief Financial Officer needs to consider when making sure the company's cost of equity calculations match its targeted capital structure. It is appropriate to consider financial leverage in general, as I do in my testimony. However, Mr. Sheilendranath's leverage adjustment in this proceeding has nothing to do with finance. He is using complex financial concepts (e.g., after-tax weighted-average cost of capital) to distort the fundamental mechanics of original cost ratemaking. Applying a market-based cost of equity to book value is the very definition of original cost ratemaking, but not a reason to make a leverage adjustment. Therefore, the financial leverage adjustment proposed by Mr. Sheilendranath is simply misplaced and should be removed from consideration in this proceeding.

Q. DOES MR. SHEILENDRANATH CLAIM THERE ARE ADDITIONAL RISK FACTORS THAT APPLY TO CWSC?

A. Yes. Mr. Sheilendranath claims that the following risk factors indicate that CWSC is riskier than other water utility companies in his Core Sample proxy group: 1) uncertainties related to CWSC's groundwater supplies, 2) operational risks due to wildfires, and 3) relatively high capital expenditures.[109] Additionally, he claims that CWSC will face the risk of under recovery of its fixed costs in 2023, when it is set to lose its WRAM.[110] Mr. Sheilendranath has not demonstrated that CWSC has greater non-diversifiable risk on average than other water utility companies, therefore there is no reason for it to receive an authorized ROE as high as its requested 10.35%.. CWSC should receive an authorized ROE no higher than the midpoint of properly applied model results.

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[109] Mr. Sheilendranath's Direct Testimony, Page 2, Lines 17-23 and Page 3, Lines 1-2.

Q. IS MR. SHEILENDRANATH'S 10.00% TO 10.75% COST OF EQUITY RECOMMENDATION MARKET-BASED?

A. No. Mr. Sheilendranath correctly states that "The cost of capital is defined as the expected rate of return in capital markets on alternative investments of equivalent risk."[111] However, when it comes time to make his computations, he fails to rely on the return expectations of investors as indicated by market data. Instead, he uses the expectations of economists, equity analysts, and other non-market expectations, even where market data is readily available. In other words, his cost of equity recommendation is inconsistent with the requirement of the U.S. Supreme Court that the cost of equity should be market-based.

Q. DO THE RESULTS OF MR. SHEILENDRANATH'S COST OF EQUITY MODELS PROVIDE A RELIABLE INDICATION OF CWSC'S COST OF EQUITY?

A. No. As discussed above, even the 8.25% midpoint of Mr. Sheilendranath's unadjusted model results is inflated because his models are based on non-market-based methodology that violates the purpose of rate of return regulation. Additionally, each of his COE models has specific issues that contribute to his unreasonably high results. First, I will address how his constant growth DCF method is unreliable because it mechanically uses analyst 5-

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[110] Mr. Sheilendranath's Direct Testimony, Page 2, Lines 17-23 and Page 2, Lines 20-22.

[111] Mr. Sheilendranath's Direct Testimony, Page 7, Lines 20-21.

year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth. A company cannot invest and grow with money it has paid out to investors as a dividend. Second, I will explain why the most significant flaw with Mr. Sheilendranath's multi-stage DCF methodology is his claim that its 6.1% result understates an appropriate return on equity in today's capital markets.[112] Third, I will explain how his CAPM/ECAPM methodologies overstate the cost of equity. Finally, I will explain why his so-called Implied Risk Premium method should be disregarded because it is not a market-based method.

Constant Growth DCF Method

Q. DOES MR. SHEILENDRANATH PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Mr. Sheilendranath correctly explains that "the constant growth rate DCF model requires that dividends and earnings grow at a constant rate…"[113] He further states that "If the dividend growth rates and earnings were expected to vary over some number of years before settling down into a constant growth period, then it would be appropriate to utilize a multi-stage DCF model."[114] His constant growth DCF method contradicts his own description of how the constant growth model should be implemented, however. His growth rate component is based entirely on short-term EPS growth forecasts.[115] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used be derived from a careful study of the future *sustainable* growth in cash flow anticipated by investors. As discussed in Section II on page 4, major financial institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates, as Mr. Sheilendranath has done. From page 94 to page 99 above, I explain why a future-oriented "B X R" method is superior to a five-year earnings per share growth rate forecast in providing a long-term sustainable growth rate.

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[112] To be conservative, I have excluded my non-constant growth DCF results from my COE recommendations because some of the results are below current debt cost rates for water utilities. However, with such high utility stock prices, low DCF results make financial sense and support the reliability of the DCF model.

[113] Mr. Sheilendranath's Direct Testimony, Page 44, Lines 2-3.

[114] Mr. Sheilendranath's Direct Testimony, Page 44, Lines 5-7.

[115] Mr. Sheilendranath's Direct Testimony, Schedule No. AS-5.

Multi-Stage DCF Method

Q. DO YOU AGREE WITH MR. SHEILENDRANATH THAT THE 6.1% RESULTS OF HIS MULTI-STAGE DCF SHOULD BE GIVEN LIMITED WEIGHT AT THIS TIME?

A. No. Mr. Sheilendranath claims that the low results of his multi-stage DCF model should be given limited weight at this time because of the following two reasons. First, he states that a "flight to quality" has resulted in higher than usual stock prices and lower than usual dividend yields for water utility companies. Second, he claims the current GDP growth forecast is substantially below historical forecasts.

The fact that Mr. Sheilendranath's multi-stage DCF is lower as a result of higher stock prices is a good sign that it might be measuring the market-based cost of equity. A COE model that is not impacted by market conditions could not provide a market-based cost of equity. Apparently, Mr. Sheilendranath believes this influence is a problem.

Current short-term GDP forecasts are well above historical averages, so Mr. Sheilendranath's starting premise for his second point is questionable at best. But even if his premise were true, he doesn't explain why low GDP growth expectations should not be taken into account when estimating the cost of equity.

CAPM / ECAPM

Q. PLEASE DESCRIBE MR. SHEILENDRANATH'S CAPM METHOD.

A. Mr. Sheilendranath explains that the CAPM states that "the risk premium of a security over the risk-free rate equals the product of the beta of that security and the risk premium on a value-weighted portfolio of all investments, which by definition has average risk."[116] He says that this method is defined by the following formula and four components:

$$r_s = r_f + \beta\text{s X MRP}$$

Where:

r_s = the cost of capital for investment S;
r_f = the risk-free interest rate;
β = Beta risk measure for investment S; and
MRP = the market equity risk premium.[117]

He also uses an Empirical CAPM (ECAPM). Mr. Sheilendranath claims the ECAPM is necessary because research has shown that low-beta stocks tend to have higher risk premiums than predicted by the CAPM.[118] This method includes the same four components as the CAPM, but also introduces a factor of alpha (α), which "has the effect of increasing the intercept, but reducing the slope of the Security Market Line,"[119] essentially increasing the risk-free rate of the CAPM.

Mr. Sheilendranath's ECAPM formula:

$$K_s = r_f + \alpha + \beta\text{s x } (\text{MRP} - \alpha)$$ [120]

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[116] Mr. Sheilendranath's Direct Testimony, Page 32, lines 16-18.
[117] Mr. Sheilendranath's Direct Testimony, Page 32, lines 1-5.
[118] Mr. Sheilendranath's Direct Testimony, Page 36, line 3-6.
[119] Mr. Sheilendranath's Direct Testimony, Page 36, lines 14-17.
[120] Mr. Sheilendranath's Direct Testimony, Page 36, line 12.

Q. WHAT RISK-FREE RATE DOES MR. SHEILENDRANATH USE IN HIS CAPM/ECAPM?

A. He uses a risk-free rate of 2.8% based on the forecasted yield on 20-year U.S. Treasury Bonds.[121] The implied risk-free rate of his ECAPM is 2.8% + 1.5% = 4.3%.

Q. WHAT RISK PREMIUM DOES MR. SHEILENDRANATH USE IN HIS CAPM/ECAPM?

A. Mr. Sheilendranath uses a Market Risk Premium based on historical data (7.25%) and "forward-looking measures" (7.53%). His historical MRP is based on the arithmetic average market risk premium of stocks over long-term government bonds from 1926 to the present (2020). Mr. Sheilendranath's forward-looking MRP is based on Bloomberg's February 2021 forecast.[122] Both of these methodologies are based on the S&P 500 Index as a benchmark for the market.

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[121] Mr. Sheilendranath's Direct Testimony, Page 33, lines 19-12 and page 33, lines 1-2.
[122] Mr. Sheilendranath's Direct Testimony, Page 33, lines 11-19.
[123] Mr. Sheilendranath's Direct Testimony, Page 35, lines 13-23.

Q. DOES MR. SHEILENDRANATH USE AN APPROPRIATE RISK-FREE RATE IN HIS CAPM?

A. No. The risk-free rate component of Mr. Sheilendranath's CAPM is not appropriate because it is based primarily on economists' published projections and not investors' expectations as indicated by current market yields. As of May 31, 2021, the yield on 20-year Treasury Bonds is 2.18%. Mr. Sheilendranath justifies using projected yields of 2.8%, instead of relying on current market yields, because "rates are expected to be in effect from 2022 to 2024."[124] But the current yield on long-term U.S. Treasury bonds indicates current investor expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 2.8% next year, the price of 20-year U.S. Treasury bonds would fall until the yield was about 2.8%. The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 20-year bond today expecting interest rates to increase, would be the same as giving money away. Of course, it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase from 2.18% to 2.8% any time soon.

Q. DO MR. SHEILENDRANATH'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Yes. The historical beta coefficients used by Mr. Sheilendranath are higher than a broader measure of recent historical and forward-looking beta coefficients indicate and therefore overstate the cost of equity. Mr. Sheilendranath's CAPM results likely overstate the cost of equity because he uses 5-year historical betas (averaging 0.78 for his Core Sample proxy group[125]) instead of betas based on current investor expectations. Mr. Sheilendranath's colleague, Dr. Villadsen, explains that one of the disadvantages of the CAPM as compared to the DCF is that it "relies on historical data to estimate systematic risk."[126] This is the reason I rely on option-implied betas (explained on page 74) in addition to historical betas to estimate forward-looking systematic risk in the form of beta. Even though recent spot values of option-implied betas have spiked (possibly because of the onset of the Omicron variant) and come up to the average used by Mr. Sheilendranath, option-implied betas over the past three months average 0.72 and have been as low as 0.62, indicating that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic (the average option-implied beta for my RFC Water Proxy Group averaged 0.93 for the three months ending December 31, 2019).

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[124] Mr. Sheilendranath's Direct Testimony, Page 32, lines 21-23 and Page 33, lines 1-2.

Another flaw with Mr. Sheilendranath's CAPM and ECAPM analyses is that he uses a different market index for his beta calculations than he uses for his market risk premium. He uses 5-year historical betas published by Value Line which are based on the NYSE Composite Index, but her market risk premium is based on the S&P 500 Index. As discussed above, the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium. Using exactly the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio -- sometimes significantly different values (10 basis points or more).

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[125] Mr. Sheilendranath's Direct Testimony, Page 29, Figure 8.

[126] Dr. Villadsen's Direct Testimony, Page 42-43, lines 851-856.

Q. DO YOU AGREE WITH THE RESULTS OF MR. SHEILENDRANATH'S CAPM/ECAPM ANALYSIS?

A. No, I do not agree with the results (8.46% - 8.97%)[127] of Mr. Sheilendranath's CAPM analysis because they are not based on investor expectations. My primary concern is that he uses analyst forecasts (e.g., interest rates, Bloomberg's forecasted equity returns) instead of investor expectations as revealed by market data. Mr. Sheilendranath's use of non-market-based data in his "forward-looking" CAPM analysis contradicts his statement that the cost of equity should rely on market-based data to quantify investor expectations. As elaborated throughout my testimony, contrary to interest rate projections, current low yields on long-term U.S. Treasury bonds indicate that investors do not expect interest rates to increase any time soon, because when interest rates increase the owner of a long-term bond will lose money.

Furthermore, even though historical betas are a decent way of estimating recent non-diversifiable risk expectations, they are inherently backward looking and are therefore not a reliable measure of current investor expectations. Mr. Sheilendranath himself agrees that one of the disadvantages of the CAPM and ECAPM as compared to the DCF is that it "relies upon 5 years of historical data."[128] This is the reason I rely on option-implied betas (explained on page 74) in addition to historical betas to estimate forward-looking systematic risk in the form of beta. As explained above, a broader measure of recent historical and forward-looking beta coefficients indicates that investors expect betas for water utility stocks to be lower than the historical 5-year betas relied upon by Mr. Sheilendranath.

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[127] Table 13 on page 108.

[128] Mr. Sheilendranath's Direct Testimony, Page 46, Lines 14-25 and Page 47, Lines 1-2.

Implied Equity Risk Premium Method

Q. YOU MENTIONED ABOVE THAT MR. SHEILENDRANATH'S SO-CALLED IMPLIED EQUITY RISK PREMIUM METHOD SHOULD NOT BE CONSIDERED BECAUSE IT IS NOT MARKET-BASED. PLEASE EXPLAIN.

A. As discussed above, the foundation of Mr. Sheilendranath's analytical methodology is flawed because it is not market-based. But in his DCF and CAPM method he at least includes some market data (e.g., stock prices). In the case of his Implied Market Risk Premium method, he does not use any market data at all. He does not even pretend it is market based. The overriding problem with Mr. Sheilendranath's Implied Equity Risk Premium method is that it does not address the cost of equity at all. It simply calculates the historical relationship between authorized ROEs and interest rates. Authorized ROEs are applied to book equity and therefore, in order to determine investors' return expectations, it is required to consider the market price investors are willing to pay for the companies with these authorized ROEs.

Q. PLEASE SUMMARIZE YOUR CONCERNS WITH MR. SHEILENDRANATH'S RATE OF RETURN TESTIMONY.

A. I have the following primary concerns regarding the rate of return testimony of Mr. Sheilendranath:

1. Increasing his ROE recommendation based on his leverage adjustment calculations is inappropriate because it goes against original cost ratemaking;

2. His claim that the 6.1% results of his multi-stage DCF are downward biased and should be ignored is opportunistic, non-market-based, and financially illogical;
3. The use of interest rate forecasts in his CAPM/ECAPM methods instead of market-based yields inflates the risk-free rate and thus overstates the cost of equity;
4. Instead of using available forward-looking measures of systematic risk, he only uses backward looking historical beta coefficients in his CAPM/ECAPM. Furthermore, these historical betas are flawed because they are stale and based on a market index that is inconsistent with the risk premium portion of his methodology; and
5. His Constant Growth DCF overstates the cost of equity because he mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates dividend payments, and growth.

C. Golden State Water Company

Q. PLEASE SUMMARIZE THE TESTIMONY OF DR. HUNT.

A. Dr. Hunt recommends GSWC be allowed an ROE of 10.50%, and that is the ROE being requested by GSWC.[129] Dr. Hunt arrived at his recommendation by applying his own versions of the Discounted Cash Flow ("DCF") Model, Capital Asset Pricing Model ("CAPM") / Empirical Capital Asset Pricing Model ("ECAPM"), Historical Risk

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[129] Dr. Hunt's Direct Testimony, Page 4, lines 12-16.

Premium, and Expected Earnings to a proxy group of 7 publicly traded water utility companies.[130] However, like Dr. Villadsen and Mr. Sheilendranath, he claims it is necessary to make an upward adjustment to his model results to account for the difference between the utility company's market value and book value capital structures.[131] Dr. Hunt claims that GSWC is riskier than the average company in his proxy group, but he does not provide a specific adjustment to his recommended ROE to account for these risks. As outlined in Table 14 below, these approaches provide equity cost rate estimates between 8.70 and 13.68%.

TABLE 14: DR. HUNT'S COST OF EQUITY RESULTS - CORE SAMPLE
Excluding Implied Equity Risk Premium Model and Financial Risk Adjustments

METHOD	Model Results
DCF	8.70% - 10.11%
CAPM / ECAPM	12.59% - 13.68%
HISTORICAL RISK PREMIUM	9.56% - 11.55%
EXPECTED EARNINGS	11.63%

Source: Dr. Hunt's Direct Testimony, Page 5, Table 1

Q. WHY IS IT INAPPROPIRATE TO CONSIDER DR. HUNT'S FINANCIAL RISK ADJUSTMENT IN DETERMINING GSWC'S AUTHORIZED ROE?

A. As discussed above in my evaluations of CAWC and CWSC's testimonies, financial leverage is a measure of the ratio of debt financing to equity financing. As a company takes on more debt, its financial risk increases because the higher the leverage, the higher the chance of financial stress and bankruptcy. Leverage is a concept that a Chief Financial Officer needs to consider when making sure the company's cost of equity calculations match its targeted capital structure. It is appropriate to consider financial leverage in general, as I do in my testimony. However, Dr. Hunt's financial risk adjustment in this proceeding has nothing to do with finance. He is using the concept of financial risk to distort the fundamental mechanics of original cost ratemaking. Applying a market-based cost of equity to book value is the very definition of original cost ratemaking, but not a reason to make a financial risk adjustment. Therefore, the financial risk adjustment proposed by Dr. Hunt is simply misplaced and should be removed from consideration in this proceeding.

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[130] Dr. Hunt's Direct Testimony, Page 49, lines 1-9.
[131] Dr. Hunt's Direct Testimony, Page 61, lines 15-19 and page 62, lines 1-11.

Q. DOES DR. HUNT CLAIM THERE ARE ADDITIONAL RISK FACTORS THAT APPLY TO GSWC?

A. Yes. Dr. Hunt states that the following five risks factors impact investor-owned water utilities like GSWC: 1) water supply shortages from draught conditions, 2) operating a conglomeration of multiple aging water systems , 3) inverse condemnation claims from wildfire damage, 4) regulatory and political risks, and 5) economic and financial risks."[132] However, he does not state if his 10.50% ROE recommendation for GSWC includes an adjustment to account for these risks.

Q. DOES DR. HUNT DEMONSTRATE THAT THESE ADDITIONAL RISK FACTORS ARE NON-DIVERSIFIABLE RISKS THAT WILL THEREFORE IMPACT GSWC'S COST OF EQUITY?

A. No. Dr. Hunt has not provided an analysis that determines which of the risks listed above would impact GSWC's cost of equity. Investors demand compensation for non-diversifiable risks only. As explained in my CAPM section above, investors in a firm's equity face two types of risks: (1) firm-specific risk and (2) market risk (financial analysts refer to this market risk as systematic risk). Firm-specific risk refers to risks unique to the firm, such as management performance and losing market share to a new competitor. Investors do not demand a higher cost of equity for firm specific risk because they can reduce this type of risk by purchasing stocks as part of a diverse portfolio of companies if they construct the portfolio to cause the firm-specific risk of individual companies to balance out. Market-related risk refers to potential impacts from the overall market, such as a recession or interest rate changes. This risk cannot be removed by diversification, so the investor must bear it no matter what. Because the investor has no option but to bear market risk, the investor's cost of equity will reflect that risk.

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[132] Dr. Hunt's Direct Testimony, Page 12, lines 1-8.

Q. IS DR. HUNT'S 10.50% COST OF EQUITY RECOMMENDATION MARKET-BASED?

A. No. Dr. Hunt's 10.50% cost of equity recommendation is not market-based. Throughout his testimony he clearly states that GSWC's ROE should be consistent with investors' market return expectations. He states, "In the long run, regulators cannot seek to benefit customers by authorizing a below-market return without negative consequences."[133] He also states that market data can provide a direct observation of the cost of capital.[134] However, when it comes time to make his computations, he fails to rely on the return expectations of investors as indicated by market data. Instead, he uses the expectations of economists, equity analysts, and other non-market expectations, even where market data is readily available. In other words, his cost of equity recommendation is inconsistent with the requirement of the U.S. Supreme Court that the cost of equity should be market-based.

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[133] Dr. Hunt's Direct Testimony, Page 9, lines 10-11.
[134] Dr. Hunt's Direct Testimony, Page 6, lines 9-13.

Q. DO THE RESULTS OF DR. HUNT'S COST OF EQUITY MODELS PROVIDE A RELIABLE INDICATION OF GSWC'S COST OF EQUITY?

A. No. Dr. Hunt's COE models have specific issues that contribute to his unreasonably high results. First, I will address how his constant growth DCF method is unreliable because it mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth. A company cannot invest and grow with money it has paid out to investors as a dividend. Second, I will explain how his CAPM/ECAPM methodologies overstate the cost of equity. Finally, I will explain why his so-called Expected Earnings method should be disregarded because it is not a market-based method.

DCF Method

Q. WHAT FORMULA DOES DR. HUNT USE IN HIS DCF ANALYSIS?

A.

$$r = \frac{D\,(1+g)}{P} + g$$ [135]

Where:

P: $stock\ price$;
D: $dividend$;
g: $growth\ rate$.

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[135] Dr. Hunt's Direct Testimony, Page 52, lines 15-16.

Q. DOES DR. HUNT PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Dr. Hunt explains correctly addresses if it reasonable to assume a constant growth rate in a DCF model. He concludes that it is usually reasonable to assume a constant growth rate in the water utility industry.[136] However, his growth estimate is flawed because he mechanically relies on analyst five-year EPS growth forecasts without making any adjustments to ensure that these relatively short forecasts are representative of long term growth.[137] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used be derived from a careful study of what future *sustainable* growth in cash flow is anticipated by investors. As discussed in Section II on page 4, major financial institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates as Dr. Hunt has done.

Q. IS DR. HUNT'S METHODOLOGY FOR DETERMINING THE GROWTH RATE TO USE IN HIS DCF MODEL APPROPRIATE?

A. No. As stated above, Dr. Hunt uses analyst five-year earnings per share growth without attempting to reconcile the retention rate used for computing growth with the retention rate he used to compute the dividend yield. This is analogous to failing to reconcile the money you are taking out of your checking account with your future balance, i.e., the basic balancing of a checkbook. From page 94 to page 99 above, I explain why a future-oriented "B X R" method is superior to a five-year earnings per share growth rate forecast in providing a long-term sustainable growth rate.

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[136] Dr. Hunt's Direct Testimony, Page 53, lines 1-3.
[137] Dr. Hunt's Direct Testimony, Page 53, lines 12-14 and page 54, lines 1-5.

CAPM Method

Q. PLEASE DESCRIBE DR. HUNT'S CAPM METHOD.

A. Dr. Hunt explains that the CAPM method "calculates the return on common equity as the sum of the risk-free rate… and the company-specific risk measure, beta, multiplied by an expected risk premium."[138] He says that this method is defined by the following four components:

$$r = r_f + \beta \text{ X MRP}$$

Where:

r = investors' required return on common equity

r_f = the risk-free rate;
β = the company-specific risk measure; and
MRP = the market risk premium, which is the expected difference between the return on the market portfolio and the risk-free rate.[139]

He also considers an Empirical CAPM (ECAPM). Dr. Hunt claims the ECAPM is necessary because evidence shows that low-beta stocks tend to have higher returns than predicted by the CAPM.[140] ~~This method includes the same four components as the CAPM, but he applies a 75% weighting to the beta coefficient and the market risk premium portion of the equation and a 25% weighting to the market risk premium, without the beta coefficient impact.~~ ECAPM formula:

$$r = r_f + \alpha + \beta \text{ X } (\text{MRP} - \alpha)$$ [141]

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[138] Dr. Hunt's Direct Testimony, Page 56, lines 1-4.
[139] Dr. Hunt's Direct Testimony, Page 57, lines 8-15.
[140] Dr. Hunt's Direct Testimony, Page 69, lines 3-8.
[141] Dr. Hunt's Direct Testimony, Page 70, lines 7-8.

Q. WHAT RISK-FREE RATE DOES DR. HUNT USE IN HIS CAPM?

A. His risk-free rate of 3.01% is based on the Moody's Analytics's projected 20-year Treasury bond yield in 2022.[142]

Q. WHAT BETA COEFFICIENT DOES DR. HUNT USE IN HIS CAPM?

A. He uses company-specific Value Line published 5-year historical betas. Value Line's company-specific betas are based on weekly returns relative to the New York stock exchange composite index.[143] As discussed above, Dr. Hunt claims that a financial risk adjustment is required to account for the difference between the utility company's market value and book value capital structure. He implements this financial risk adjustment by increasing the company-specific betas published by Value Line, averaging 0.778 for his proxy group, to 0.9438 (Hamada Adjustment) and 1.0659 (Harris and Pringle Adjustment). The Hamada adjustment increases his CAPM result from 10.01% to 11.5%. The Harris and Pringle Adjustment increases is CAPM result from 10.01% to 12.59%.[144]

Q. WHAT RISK PREMIUM DOES DR. HUNT USE IN HIS CAPM?

A. Dr. Hunt uses two different historical risk premiums and two prospective risk premiums derived from data published by Morningstar. His first historical risk premium (7.25%) is based on the arithmetic mean of the return differential between the S&P 500 and long-term U.S. Treasury Bonds.[145] His second historical risk premium (8.86%) is based on a linear regression with the market risk premium (income return of large-capitalization stocks between 1926 and 2019) as the dependent variable and the income return on the long-term government bond as the independent variable.[146] Dr. Hunt's prospective market risk premium methods (12.39%[147], 13.33%[148] and 10.46%[149]) are based on a DCF model applied to dividend-paying stocks in the S&P 500.[150] His second prospective risk premium (10.46%) is based on the expected return on the S&P 500 Index by plugging in S&P's published dividend yield forecasts and five-year growth rate projections into a DCF model.[151] His market risk premium results range from 7.25% to 9.4%.[152]

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[142] Dr. Hunt's Direct Testimony, Page 66, lines 2-4.
[143] Dr. Hunt's Direct Testimony, Page 66, lines 2-4.
[144] Dr. Hunt's Direct Testimony, Appendix B.
[145] Dr. Hunt's Direct Testimony, Pages 63 – 65.

Q. DOES DR. HUNT USE AN APPROPRIATE RISK-FREE RATE IN HIS CAPM?

A. No. The risk-free rate component of Dr. Hunt's CAPM is not appropriate because it is based primarily on economist published projections and not investors' expectations as indicated by current market yields. As of December 31, 2021, the yield on 30-year Treasury Bonds is 1.90%. Dr. Hunt uses a projected yield of 3.1%, instead of relying on market yields. It is appropriate to use a risk-free rate based on the current yield on U.S. Treasury bonds because these yields indicate market expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 3.01% next year, the price of 30-year U.S. Treasury bonds would fall until the yield was about 3.01%. The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 30-year bond today expecting interest rates to increase (more than double according to Dr. Hunt), would be the same as giving money away. Of course it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase from 1.90% to 3.01% any time soon.

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[146] Dr. Hunt's Direct Testimony, Pages 65, lines 2-18 and page 66, lines 1-4.

[147] Average DCF result.

[148] Market-capitalization-weighted average DCF result.

[149] Based on Morningstar's long-term growth rate for the S&P 500 index of 12.26%.

[150] Dr. Hunt's Direct Testimony, Pages 66, lines 5-19 and page 67, lines 1-8.

[151] Dr. Hunt's Direct Testimony, Page 66, line 10.

[152] Dr. Hunt's Direct Testimony, Page 66, line 10.

Q. DO DR. HUNT'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Yes. The historical beta coefficients used by Dr. Hunt are higher than a broader measure of recent historical and forward-looking beta coefficients indicate and therefore overstate the cost of equity. Dr. Hunt's CAPM results likely overstate the cost of equity because he uses 5-year historical betas (averaging 0.78 for his proxy group[153]) instead of betas based on current investor expectations. Even though recent spot values of option-implied betas have spiked (possibly because of the onset of the Omicron variant) and come up to the average used by Dr. Hunt, option-implied betas over the past three months average 0.72 and have been as low as 0.62, indicating that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic (the average option-implied beta for my RFC Water Proxy Group averaged 0.93 for the three months ending December 31, 2019).

Another flaw with Dr. Hunt's CAPM and ECAPM analyses is that he uses a different market index for his beta calculations than he uses for his market risk premium. He uses 5-year historical betas published by Value Line which are based on the NYSE Composite Index, but his market risk premium is based on the S&P 500 Index. As discussed above, the most important aspect of selecting a market index for a CAPM analysis, which is to be consistent and use the same index for the calculation of beta as for the calculation of the market risk premium. Using exactly the same beta calculation methodology with a different market index will result in different values of beta for a given company or portfolio -- sometimes significantly different values (10 basis points or more).

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[153] Dr. Hunt's Direct Testimony, Appendix B.

Q. DO YOU AGREE WITH THE RESULTS OF DR. HUNT'S CAPM ANALYSIS?

A. No, I do not agree with the results (12.59% - 13.68%) of Dr. Hunt's CAPM analysis because they are not based on investor expectations and include inappropriate adjustments (financial risk, small firm impact). His historical risk premium methods fail to account for the fact that the price-to-earnings ratios of companies in the S&P 500 have been expanding for decades. The P/E ratio, using one-year average earnings, was 10.23 at the beginning of 1926 and ended the year 2020 at an estimated 38.94, an average increase of 1.4% per year. According to Dr. Hunt's source, Duff & Phelps, the historical price-to-earnings ratio growth of 0.96% per year should be subtracted from the equity forecast because "it is not believed that P/E will continue to increase in the future."[154] After making this necessary adjustment to account for expanding price-to-earnings ratios, Duff & Phelps calculates a geometric supply-side equity risk premium is 4.07% and an arithmetic supply-side risk premium of 6.00%. Dr. Hunt's average market risk premium of 8.99% (producing CAPM results of between 12.59% and 13.68%) is clearly excessive.

He uses historical data (e.g., betas) and analyst forecasts (e.g., interest rates, S&P's dividend, and earnings forecasts) instead of investor expectations as revealed by market data. Dr. Hunt's use of historical and non-market-based data in his "forward-looking" CAPM analysis contradicts his statement that the cost of equity should rely on market-based data to quantify investor expectations. Stock option data indicates that investors expect betas for water utility stocks to be lower than historical betas over the time periods used by Dr. Hunt (5 years and 10 years). Low yields on long-term U.S. Treasury bonds indicate that investors do not expect interest rates to increase any time soon because when interest rates increase the owner of a long-term bond will lose money.

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[154] Duff & Phelps, 2021 SBBI Yearbook, Page 10-28.

Q. PLEASE SUMMARIZE DR. HUNT'S HISTORICAL RISK PREMIUM METHODOLOGY.

A. Dr. Hunt's Historical Risk Premium method involves calculating the difference between the annual total return (dividends and capital gains) on the Standard & Poor's Utility stock index and the income component of the long-term government bond yield between 1938 and 2020.[155] He calculates a 6.55% historical risk premium based on the average difference between the annual returns of the Standard & Poor's Utility stock index and the income return of long-term government bonds for each year over this time period. However, he claims that the historical risk premium averages 8.54% when the yield on long-term government bonds is 5% or lower. As shown below, he derives his Historical Risk Premium results (9.56% and 11.55%) by adding a projected yield on 20-Year U.S. Treasury bonds (3.01%) to his two historical premium estimates:

Historical Average	
Risk Premium:	6.55%
Projected 20-year U.S. Treasury Yield:	3.01%
Risk Premium on SP 500:	9.56%
Average for bond yield below 5%:	
Risk Premium:	8.54%

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[155] Duff & Phelps, 2021 SBBI Yearbook, Page 10-28.

Projected 20-year U.S. Treasury Yield:	3.01%
Risk Premium on SP 500:	11.55%

Q. DO YOU AGREE WITH THE RESULTS OF DR. HUNT'S HISTORICAL RISK PREMIUM METHOD?

A. No, I do not agree with the results (9.56% - 11.55%) of Dr. Hunt's Historical Risk Premium method for the following reasons. First, he overstates his results by using arithmetic mean returns instead of geometric mean returns. Second, as discussed above in my critique of his CAPM/ECAPM methodology, he fails to account for the fact that the price-to-earnings ratios of companies in the S&P 500 have been expanding for decades. Third, he uses projected interest rates (non-market-based) instead of market-based yield.

Q. Q. PLEASE EXPLAIN WHY GEOMETRIC MEAN (AND NOT ARITHMETIC MEAN USED BY DR HUNT) SHOULD BE USED TO CALCULATE THE HISTORICAL RISK PREMIUM.

A. The geometric mean measures the compounded annual return investors actually receive, whereas the arithmetic mean is higher than actual returns.[156] The author of the SBBI Yearbook relied upon by Dr. Hunt stated the following with respect to using the geometric mean:

> Investors typically use the Large Company Stock geometric mean returns minus the Long-Term Government Bond return as their characterization of the historical ERP, which for 1926-2010 is 4.4%.[157]

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[156] The geometric mean is always equal to or ~~greater~~ lower than the arithmetic mean. It is only equal to the arithmetic mean when growth is constant from year to year.

[157] Roger G. Ibbotson, 2011, *The Equity Risk Premium*.

Between 1926 and 2020 the Large Company Stock geometric mean returns minus the Long-Term Government Bond return is 4.6% (10.3% - 5.7%).[158]

The SBBI yearbook provides both the average annual return (arithmetic average) and the compounded annual return (geometric average) for large capitalization stocks. Investors earned a compounded annual return (geometric average) of 10.3% between 1926-2020. The average annual return (arithmetic average) for large capitalization stocks for the same period, was 12.2%. However, as stated above, the arithmetic mean can be a misleading guide to investor returns and therefore the cost of equity if used as a model input. As explained in a Wall Street Journal article entitled "Financial Advisors and Fuzzy Math":

> Some financial advisers rely too heavily on a formula known as arithmetic average, which can be misleading when investing for the long term. Financial advisers who use this formula may be overstating your potential profit and leading you to take risks you might otherwise avoid, academics and other financial professionals say.[159]

Q. DO YOU AGREE WITH DR. HUNT'S HISTORICAL RISK PREMIUM METHOD?

A. No. Dr. Hunt's use of a projected yield on 20-Year U.S. (3.01%) Treasury bonds rather than current the market yield (1.85% as of July 15, 2021) considerably overstates the results of his Historical Risk Premium method. As discussed above, the current yield on long-term U.S. Treasury bonds indicates current investor expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 3.01% next year, the price of 20-year U.S. Treasury bonds would fall until the yield was about 3.01%.

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[158] Duff & Phelps, 2021 SBBI Yearbook, Page 1-16.

[159] See Kaja Whitehouse, Financial Advisors and Fuzzy Math, Wall Street Journal, Oct. 8, 2003. https://www.wsj.com/articles/SB106556077528993600

The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 20-year bond today expecting interest rates to increase, would be the same as giving money away. Of course, it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase to 3.01% in 2022, as Dr. Hunt assumes.

Expected Earnings Analysis

Q. PLEASE EXPLAIN THE EXPECTED EARNINGS ANALSYIS PRESENTED BY DR. HUNT.

A. Dr. Hunt's expected earnings approach consists of estimating what investors expect to earn on the book value for the stocks of the 7 companies in his proxy group. In order to estimate investors expected return on book equity, he relied exclusively on Value Line's projections. He starts with the publications future expected return on book equity forecasts for the period from 2023-2025 for water utility companies. He increases these forecasts to account for the growth in new common stock.

Q. IS THE EXPECTED EARNINGS METHODOLOGY VALID?

A. No. The overriding problem with Dr. Hunt's expected earnings analysis is that it did not address the cost of equity at all. It simply considered the returns on book equity expected to be achieved by Value Line in the next 3 to 5 years. He surprisingly claims that this method is helpful because it is not market-based. He states that this non-market-based method is helpful because "the return on equity that the Commission authorizes for inclusion in rates will be applied to book value rate base, not market value rate base."[160]

Applying a market-based cost of equity to book value is the very definition of original cost ratemaking, but not a reason to make a financial risk adjustment. Therefore, consumers will be overcharged if rates are set based on accounting returns that are significantly higher than returns expected by investors are market.[161] Dr. Hunt's Expected Earnings Method, just like his so-called financial risk adjustment, is simply misplaced and should be removed from consideration in this proceeding.

Q. DOES THE FEDERAL ENERGY REGULATORY COMMISSION (FERC) USE THE EXPECTED EARNINGS METHOD IN ITS ROE PRECEEDINGS?

A. No. FERC determined it is not appropriate to use the Expected Earnings model because "the record does not support departing from our traditional use of market-based approaches to determine base ROE."[162] FERC goes on to say:

> In Hope, the Supreme Court explained that 'the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.' In order to determine this, we must analyze the returns that are earned on 'investments in other enterprises having corresponding risks,' but investors cannot invest in an enterprise at book value and must instead pay the prevailing market price for an enterprise's equity. As a result, the expected return on a utility's book value does not reflect 'returns on investments in other enterprises' because book value does not reflect the value of any investment that is available to an investor in the market, outside of the unlikely situation in which market value and book

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[160] Dr. Hunt's Direct Testimony, Page 76, lines 1-5

[161] The market-to-book ratios of water utility companies, including those in Dr. Hunt's proxy group are significantly higher than 1. Therefore, investors expect a return on market that is significantly lower than on a book equity. The reason why expected market returns will be lower than expected returns on book equity for utility stocks is similar to why the expected returns to a real estate investor is lower the higher price paid for a property keeping rental income constant.

[162] FERC Opinion No. 569, par 200.

> value are exactly equal. Accordingly, we find that relying on the Expected Earnings model would not satisfy the requirements of Hope.[163]

As explained clearly by FERC, the Expected Earnings model should be excluded from consideration in this proceeding because it violates regulatory principles that require the cost of equity to be market-based.

Q. PLEASE SUMMARIZE YOUR CONCERNS WITH DR. HUNT'S TESTIMONY.

A. Dr. Hunt's 10.50% ROE recommendation is significantly higher than GSWC's market-based cost of equity. If his recommendations are used to set rates, consumers will be significantly overcharged. I have the following primary concerns regarding Dr. Hunt's testimony:

1. His 10.50% cost of equity recommendation is not market-based;
2. Constant growth DCF model is unreliable because it mechanically uses analysis 5-Year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth.
3. CAPM/ECAPM – overstates cost of equity by using a non-market-based risk free, inflated equity risk premium, and flawed betas;
4. Financial Risk Adjustment – Invalid and should be disregarded;
5. Expected Earnings method is not market-based – has been completely discredited by FERC.

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[163] FERC Opinion No. 569, par 201.

D. San Jose Water Company

Q. PLEASE SUMMARIZE THE TESTIMONY OF MS. BULKLEY.

A. Ms. Bulkley has recommended that SJWC be allowed an ROE of 9.75% to 10.75% and SJWC is requesting a 10.30% ROE.[164] Ms. Bulkley arrived at her recommendation based upon her own modified versions of the following COE models: 1) DCF model, 2) CAPM, 3) ECAPM, and 4) Expected Earnings Analysis.[165] As outlined in Table 15 below, these approaches provide equity cost rate estimates between 9.65% and 11.98%.

TABLE 15: MS. BULKLEY'S COST OF EQUITY RESULTS - CORE SAMPLE

METHOD	Model Results
Constant Growth DCF	9.65% - 10.07%
CAPM (Market Return of S&P 500 Index)	11.09% - 11.37%
CAPM - Long-Term Average Beta	10.52% - 10.65%
ECAPM (Market Return of S&P 500 Index)	11.74% - 11.96%
ECAPM - Long-Term Average Beta	11.31% - 11.42%
Expected Earnings	11.98%

Source: Ms. Bulkley's Direct Testimony, Page 5, Figure 1

Q. DOES MS. BULKLEY CLAIM THERE ARE ADDITIONAL RISK FACTORS THAT APPLY TO SJWC?

A. Yes. Ms. Bulkley states that her COE model results alone do not provide an appropriate cost of equity for SJWC.[166] She lists many risk factors that she claims impact SJWC, including limitations on its ability to adjust rates because of California's three-year GRC cycle, lack of regulatory diversifications, lack of geographic diversification, inverse condemnation claims from wildfire damage, and not having a WRAM or a MCBA mechanism.[167] Ms. Bulkley claims SJWC's cost of equity is 20 basis points higher than her model results indicate because, all else equal, due to SJWC not having a WRAM or a MCBA mechanism.[168]

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[164] Ms. Bulkley's Direct Testimony, Page 6, lines 10-13.

[165] Ms. Bulkley's Direct Testimony, Page 3, lines 19-24.

[166] Ms. Bulkley's Direct Testimony, Page 45, lines 19-25.

Q. IS MS. BULKLEY'S 9.75% TO 10.75% COST OF EQUITY MARKET-BASED?

A. No. Ms. Bulkley says that the cost of equity is market-based,[169] but when applying her approaches, there are key places where she fails to use market data. For example, two thirds of her CAPM results (2 of 3) are based on interest rate forecasts ("Q3 2021-Q3 2022" and "2022-2026") instead of directly observable market yields.[170] Her claim that utility stocks are expected to underperform in the near term[171] is problematic for at least the following two reasons. First, she does not base her claim regarding future utility stock price performance on market data. Her claim is based on her own opinion and pure speculation. Second, she does not use a multi-stage DCF model to directly measure if, in fact, investors expect utility stocks to underperform in the near term.

Q. DO THE RESULTS OF MS. BULKLEY'S COST OF EQUITY MODELS PROVIDE A RELIABLE INDICATION OF SJWC'S COST OF EQUITY?

A. No. Ms. Bulkley's 9.75% and 10.75% ROE recommendation is significantly higher than SJWC's market-based cost of equity. If her recommendation is used to set rates, consumers will be significantly overcharged. Ms. Bulkley's 9.75% and 10.75% ROE recommendation is excessive largely because: (1) her COE calculations are based on a flawed analytical approach and an inappropriate definition of the cost of equity, despite defining it correctly in considerable portions of filed testimony, and (2) her interpretation of current capital markets include unknowable and/or speculative predictions.

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[167] Ms. Bulkley's Direct Testimony, Pages 46-54.
[168] Ms. Bulkley's Direct Testimony, Page 48, lines 10-12.
[169] Ms. Bulkley's Direct Testimony, Page 28, lines 16-18.
[170] Ms. Bulkley's Direct Testimony, Schedule AEB-6, Page 2-3.
[171] Ms. Bulkley's Direct Testimony, Page 4, lines 23-27.

Additionally, each of her COE models has specific issues that contribute to her unreasonably high results. First, I will address how her constant growth DCF method is unreliable because it mechanically uses analyst 5-year EPS growth rates as a proxy for growth without considering the mathematical relationship between retention rates, dividend payments, and growth. A company cannot invest and grow with money it has paid out to investors as a dividend. Second, I will explain how her CAPM/ECAPM methodologies overstate the cost of equity by using a different market index for her beta calculations than she uses to calculate the risk premium portion of her CAPM, among other reasons. Finally, I will explain why her so-called Expected Earnings method should be disregarded because, as FERC concluded, it is not a market-based method.

Q. PLEASE LIST THE ADDITIONAL FACTORS MS. BULKLEY CLAIMS MUST BE CONSIDERERED WHEN DETERMINING THE COMPANY'S COST OF EQUITY.

A. Ms. Bulkley claims SJWC's cost of equity is 20 basis points higher than her model results indicate because of the additional risk related to not having a WRAM or MCBA mechanisms.

Q. DO YOU AGREE WITH MS. BULKLEY'S CLAIM THAT SJWC IS RISKIER THAN THE PROXY GROUP?

A. I do not agree with Ms. Bulkley's claim that SJWC is riskier than the proxy group because she has not demonstrated that the claimed risks will impact SJWC's non-diversifiable risk. As explained earlier in my testimony, investors demand compensation only for risks that they are not able to eliminate through diversification.

DCF Method

Q. WHAT FORMULA DOES MS. BULKLEY USE IN HER DCF ANALYSIS?

A.

$$k = \frac{D_0(1+g)}{P_0} + g$$ [172]

Where:

P_0: *stock price*;
D_0: *dividend*;
g: *growth rate*.

Q. DOES MS. BULKLEY PROPERLY APPLY THE SIMPLIFIED OR CONSTANT GROWTH DCF METHOD?

A. No. Ms. Bulkley explains correctly that the constant growth DCF method "assumes" a single growth rate in perpetuity and that "one must assume that the payout ratio remains constant and that earnings per share, dividends per share, and book value per share all grow at the same constant rate."[173] Her DCF method contradicts her own description of how the constant growth model should be implemented, however. Her growth estimate relies entirely on analyst five-year EPS growth forecasts.[174] The correct application of the DCF method requires that the dividend yield be computed properly, and that the growth rate used be derived from a careful study of what future *sustainable* growth in cash flow is anticipated by investors. As discussed above, major financial institutions like J.P. Morgan Chase do not use a growth rate based on analyst 5-year EPS growth rates as Ms. Bulkley has done.

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[172] Ms. Bulkley's Direct Testimony, Page 32, lines 17-18.
[173] Ms. Bulkley's Direct Testimony, Page 34, lines 15-18.

Q. IS MS. BULKLEY'S METHODOLOGY FOR DETERMINING THE GROWTH RATE TO USE IN HER DCF MODEL APPROPRIATE?

A. No. As stated above, Ms. Bulkley uses analyst five-year earnings per share growth without attempting to reconcile the retention rate used for computing growth with the retention rate she used to compute the dividend yield. This is analogous to failing to reconcile the money you are taking out of your checking account with your future balance, i.e., the basic balancing of a checkbook. From page 94 to page 99 above, I explain why a future-oriented "B X R" method is superior to a five-year earnings per share growth rate forecast in providing a long-term sustainable growth rate.

CAPM Method

Q. PLEASE DESCRIBE MS. BULKLEY'S CAPM METHOD.

A. Ms. Bulkley explains that the CAPM method "estimates the cost of equity for a given security as a function of a risk-free return plus a risk premium to compensate investors for the non-diversifiable or 'systematic' risk of that security."[175] She says that this method is defined by the following four components:

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[174] Ms. Bulkley's Direct Testimony, Page 35, lines 3-8.

$$K_s = r_f + \beta\,(r_{m-}r_f)$$

Where:

K_s = the required market ROE;
β = Beta coefficient of an individual security;
r_f = the risk-free ROE; and
r_m = the required return on the market as a whole.[176]

She also considers an Empirical CAPM (ECAPM). Ms. Bulkley claims the ECAPM is necessary because academic research indicates that the risk return relationship is different than the one estimated by the CAPM.[177] This method includes the same four components as the CAPM, but she applies a 75% weighting to the beta coefficient and the market risk premium portion of the equation and a 25% weighting to the market risk premium, without the beta coefficient impact. ECAPM formula:

$$K_s = r_f + 0.75\beta\,(r_{m-}r_f) + \ 0.25\,(r_{m-}r_f)^{178}$$

Q. WHAT RISK-FREE RATE DOES MS. BULKLEY USE IN HER CAPM?

A. She uses the following three risk-free rates: (1) Current yield on 30-year Treasury bonds (2.31%), (2) Projected (Q2 2021 through Q2 2022) yield 30-year Treasury bonds (2.60%), and (3) Projected (between 2022 and 2026) yield 30-year Treasury bonds (2.80%).[179]

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[175] Ms. Bulkley's Direct Testimony, Page 37, lines 6-8.
[176] Ms. Bulkley's Direct Testimony, Page 37, lines 13-20.
[177] Ms. Bulkley's Direct Testimony, Page 42, lines 9-14.
[178] Ms. Bulkley's Direct Testimony, Page 42, line 3.
[179] Ms. Bulkley's Direct Testimony, Page 38, lines 9-13.

Q. WHAT BETA COEFFICIENT DOES MS. BULKLEY USE IN HER CAPM?

A. She uses the following two historical beta coefficients: (1) Bloomberg 10-year weekly return relative to the S&P 500 index, and (2) Value Line 5-year historical weekly return relative to the New York stock exchange composite index.[180]

Q. WHAT RISK PREMIUM DOES MS. BULKLEY USE IN HER CAPM?

A. Ms. Bulkley uses a "forward-looking" market risk premium in her CAPM analysis which she defines as the expected returned on the S&P 500 less the 30-year Treasury bond yield. She calculates the expected return on the S&P 500 Index by plugging S&P's published dividend yield forecasts and five-year growth rate projections into a DCF model. Her market risk premium results range from 10.91% to 11.40%.[181]

Q. DOES MS. BULKLEY USE AN APPROPRIATE RISK-FREE RATE IN HER CAPM?

A. No. The risk-free rate component of Ms. Bulkley's CAPM is not appropriate because it is based primarily on economist published projections and not investors' expectations as indicated by current market yields. As of December 31, 2021, the yield on 30-year Treasury Bonds is 1.90%. Ms. Bulkley includes projected yields of 2.6% and 2.8%, instead of relying on current market yields, because she claims the cost of equity should be "forward-looking" and the CAPM should "reflect the expectations of the market at that time."[182] But the current yield on the 30-year U.S. Treasury bond indicates market expectations. If investors started to believe that the yield on long-term U.S. Treasuries was going to increase to 2.6% next year, the price of 30-year U.S. Treasury bonds would fall until the yield was about 2.6%. The current yield would be nearly the same as next year's yield because the price of bonds moves inversely to yields. Buying a 30-year bond today expecting interest rates to increase would be the same as giving money away. Of course it is possible that interest rates will increase, but it is safe to say that the market does not expect that it is highly probable that interest rates will increase from 1.90% to 2.6% or 2.8% any time soon. In fact, the yield on the 30-Year U.S. Treasury bond has fallen to 1.92% as of July 15, 2021. Interest rates are unpredictable and may increase or decrease in the future therefore Ms. Bulkley's market speculations, including her reliance on interest rate projections for the risk-free rate portion of her CAPM should not be used to set rates in this proceeding.

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[180] Ms. Bulkley's Direct Testimony, Page 39, lines 5-10.

[181] Ms. Bulkley's Direct Testimony, Page 39, lines 16=23 and Page 40, lines 1-4.

[182] Ms. Bulkley's Direct Testimony, Page 38, line 19 and Page 39, line 1.

Q. DO MS. BULKLEY'S BETA COEFFICIENTS OVERSTATE THE COST OF EQUITY?

A. Yes. The historical beta coefficients used by Ms. Bulkley are higher than a broader measure of recent historical and forward-looking beta coefficients indicate and therefore overstate the cost of equity. Ms. Bulkley's CAPM results likely overstate the cost of equity because she uses 5-year and 10-year historical betas (averaging 0.79 for her proxy group[183]) instead of betas based on current investor expectations. Even though recent spot values of option-implied betas have spiked (possibly because of the onset of the Omicron variant) and come up to the average used by Ms. Bulkley, option-implied betas over the past three months average 0.72 and have been as low as 0.62, indicating that investors expect water utility stock price movements to be less correlated with the overall market than before the pandemic (the average option-implied beta for my RFC Water Proxy Group averaged 0.93 for the three months ending December 31, 2019).

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[183] Ms. Bulkley's Direct Testimony, Schedule AEB-6, Page 1.

Q. DO YOU AGREE WITH THE RESULTS OF MS. BULKLEY'S CAPM / ECAPM ANALYSES?

A. No, I do not agree with the results (10.52% - 11.96%)[184] of Ms. Bulkley's CAPM / ECAPM analyses because they are not based on investor expectations. She uses historical data (e.g., betas) and analyst forecasts (e.g., interest rates, earnings growth) instead of investor expectations as revealed by market data. Ms. Bulkley's use of historical and non-market-based data in her "forward-looking" CAPM analysis contradicts her statement that the cost of equity should rely on market-based data to quantify investor expectations. Stock option data indicates that investors expect betas for water utility stocks to be lower than historical betas over the time periods used by Ms. Bulkley (5 years and 10 years). Low yields on long-term U.S. Treasury bonds indicate that investors do not expect interest rates to increase any time soon because when interest rates increase the owner of a long-term bond will lose money.

Expected Earnings Analysis

Q. PLEASE EXPLAIN THE EXPECTED EARNINGS ANALSYIS PRESENTED BY MS. BULKLEY.

A. Ms. Bulkley's expected earnings approach consists of estimating what investors expect to earn on the book value for the stocks of the 7 companies in her proxy group. She claims that return on book equity is relevant to the cost of equity. In order to estimate investors expected return on book equity, she relied exclusively on Value Line's projections. She starts with the publications future expected return on book equity forecasts for the period from 2023-2025 for water utility companies. She increases these forecasts to account for the growth in new common stock.

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[184] Ms. Bulkley's Direct Testimony, Page 5, Figure 1.

Q. IS THE EXPECTED EARNINGS METHODOLOGY VALID?

A. No. The overriding problem with Ms. Bulkley's expected earnings analysis is that it does not address the cost of equity at all. It simply considers the returns on book equity that were achieved and are expected to be achieved by Value Line in the next 3 to 5 years. The earned return on book equity is an entirely different concept from the cost of equity, which should be market-based. For this reason, this method has recently been discredited and eliminated from consideration in Federal Energy Regulatory Commission (FERC) ROE proceedings. FERC determined it is not appropriate to use the Expected Earnings model because "the record does not support departing from our traditional use of market-based approaches to determine base ROE."[185] FERC goes on to say:

> In Hope, the Supreme Court explained that 'the return to the equity owner should be commensurate with returns on investments in other enterprises having corresponding risks.' In order to determine this, we must analyze the returns that are earned on 'investments in other enterprises having corresponding risks,' but investors cannot invest in an enterprise at book value and must instead pay the prevailing market price for an enterprise's equity. As a result, the expected return on a utility's book value does not reflect 'returns on investments in other enterprises' because book value does not reflect the value of any investment that is available to an investor in the market, outside of the unlikely situation in which market value and book value are exactly equal. Accordingly, we find that relying on the Expected Earnings model would not satisfy the requirements of Hope.[186]

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[185] FERC Opinion No. 569, Par 200.
[186] FERC Opinion No. 569, Par 201.

As explained clearly by FERC, the Expected Earnings model should be excluded from consideration in this proceeding because it violates regulatory principles that require the cost of equity to be market-based.

Q. PLEASE SUMMARIZE YOUR CONCERNS WITH MS. BULKLEY'S TESTIMONY?

A. Ms. Bulkley's 9.75% to 10.75% ROE recommendation is significantly higher than SJWC's market-based cost of equity. If her recommendations are used to set rates, consumers will be significantly overcharged. Ms. Bulkley's 9.75% to 10.75% ROE recommendation is excessive largely because: (1) her COE calculations are based on a flawed analytical approach and an inappropriate definition of the cost of equity, despite defining it correctly in considerable portions of filed testimony, and (2) her interpretation of current capital markets include unknowable and/or speculative predictions.

VI. CONCLUSION

Q. PLEASE SUMMARIZE YOUR RECOMMENDATIONS IN THIS CASE.

A. As shown on Table 1 on page 4, I recommend the following specific ROEs from the ranges shown in parentheses for the CCAWCs for the years 2022-2024:

California American Water Company:	7.52%	(7.00% to 8.04%)
California Water Service Company:		(7.28% to 8.33%)
Golden State Water Company:		(6.99% to 8.03%)
San Jose Water Company:		(7.13% to 8.17%)

My recommendations incorporate capital structure and cost of debt recommendations found in Cal Advocates' witness Mr. Jawadul Baki's Direct Testimony.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.

APPENDIX A: RESUME OF AARON L. ROTHSCHILD

SUMMARY

Financial professional providing U.S. public utility commissions financial tools and expert testimony to assist in rate setting for regulated utility companies (e.g., regulated electric distribution providers, natural gas pipelines). Relevant experience includes developing and applying methodologies that directly measure investors' equity return expectations based on stock option prices, applied mathematics research for utility industry as an affiliate of the New England Complex Systems Institute, and serving as Head of Business Analysis for a major U.S. telecom firm in Asia Pacific.

EXPERIENCE

Rothschild Financial Consulting, Ridgefield, CT **November 2001- present**
Independent consulting firm specializing in utility sector
President

- Provide financial expert testimony (e.g., rate of return and M&A) to regulators, policy makers, foundations, and consumer groups in utility rate case proceedings, including representing the California Public Advocates Office and the Wild Tree Foundation in the ongoing California water and energy cost of capital proceedings
- Developed cost of equity models that have been adopted by the Public Service Commission of South Carolina in 2020 (decision upheld by the South Carolina Supreme Court in September 2021) and the Connecticut Public Regulatory Authority in September 2021
- Developing market-based cost of equity methodology in ongoing regulated natural gas pipeline case before the Federal Energy Regulatory Commission (FERC), including proposing replacing equity analyst earnings per-share forecasts (IBES, Value Line) with options-implied growth expectations to determine authorized return on equity (ROE)
- Present at utility regulation conferences (NARUC/NASUCA and MARC) regarding rate of return, power purchase agreements, complex systems science, and subsidy auctions

360 Networks, Hong Kong **January 2001 - October 2001**
Pioneer of the fiber optic telecommunications industry
Senior Manager

- Business development and investment evaluation
- Negotiated landing rights and formed local partnerships in Korea, Japan, Singapore, and Hong Kong for $1 billion undersea cable project
- Structured fiber optic bandwidth swapping agreement with Enron and Global Crossing
- Established relationships with Hong Kong based Investment Bankers to communicate Asia Pacific objectives and accomplishments to Wall Street

Dantis, Chicago, IL **July 2000- December 2000**
Start-up managed data-hosting services provider
Director

- Built capital raise valuation models and negotiated with potential investors
- Team raised $100M from venture capital firm through valuation negotiations and internal strategic analysis

MFS, MCI-WorldCom, Chicago, Hong Kong, Tokyo September 1996- July 2000
American Telecommunications Company
Head of Business Analysis for Japan operations

- Managed staff of 5 business development analysts
- Raised $80M internally for Japanese national fiber network expansion plan by conducting an investment evaluation and presenting findings to CEO of international operations in London, UK
- Built financial model for local fiber optic investment evaluation that was used by business development offices in Oak Brook, IL and Sydney, Australia

EDUCATION

Vanderbilt University, Nashville, TN 1994-1996
MBA, Finance

- Completed business plan for Nextlink Communications in support of their national fiber optic network expansion, including identifying opportunities from passage of Telecom Act of 1996
- Developed analytical framework to evaluate predictability of rare events
- Provided financial and accounting analysis to Chicago's consumer advocate, the Citizens Utility Board (CUB) as a summer intern

Clark University, Worchester, MA 1990 - 1994
BA, Mathematics

APPENDIX B: TESTIFYING EXPERIENCE OF AARON L. ROTHSCHILD

Filed Rate of Return Testimonies:

California

- Pacific Gas and Electric Company, Application 21-01-004, Securitization, February 2021
- Pacific Gas and Electric Company, Application 20-04-023, Securitization, October 2020
- Southern California Edison, Application 20-07-008, Securitization, September 2020
- San Diego Gas & Electric Company, Application 19-04-017, Rate of Return, August 2019
- Southern California Gas Company, Application 19-04-016, Rate of Return, August 2019
- Pacific Gas and Electric Company, Application 19-04-015, Rate of Return, August 2019
- Southern California Edison, Application 19-04-014, Rate of Return, August 2019
- Liberty Utilities, Application A.18-05-006, Rate of Return, August 2018
- San Gabriel Water Company, Application 18-05-005, Rate of Return, August 2018
- Suburban Water Company, Application 18-05-004, Rate of Return, August 2018
- Great Oaks Water Company, Application 18-05-001, Rate of Return, August 2018
- California Water Service Company, Application 17-04-006, Rate of Return, August 2017
- California American Water Company, Application 17-04-003, Rate of Return, August 2017
- Golden State Water Company, Application 17-04-002, Rate of Return, August 2017
- San Jose Water Company, Application 17-04-001, Rate of Return, August 2017

Colorado

- Public Service Company of Colorado, Docket No. 11AL-947E, Rate of Return, March 2012

Connecticut

- Eversource and United Illuminating, Docket No. 17-12-03RE11, Rate of Return / Interim Rate Reduction, April 2021
- United Water Connecticut, Docket No. 07-05-44, Rate of Return, November 2008
- Valley Water Systems, Docket No. 06-10-07, Rate of Return, May 2007

Delaware

- Tidewater Utilities, Inc., PSC Docket No. 11-397, Rate of Return, April 2012

Florida

- Florida Power & Light (FPL), Docket No. 070001-EI, October 2007
- Florida Power Corp., Docket No. 060001 Fuel Clause, September 2007

New Jersey

- Aqua New Jersey, Inc., BPU Docket No. WR11120859, Rate of Return, April 2012

Maryland

- Delmarva Power & Light, Case No. 9317, Rate of Return, June 2013
- Columbia Gas of Maryland, Case No. 9316, Rate of Return, May 2013
- Potomac Electric Power Company, Case No. 9286, Rate of Return, March 2012
- Delmarva Power & Light, Case No. 9285, Rate of Return, March 2012

North Dakota

- Montana-Dakota Utilities Co., Case No. PU-20-379, Rate of Return, January 2021
- Otter Tail Power Company, Case No. PU-17-398, Rate of Return, May 2018
- Montana-Dakota Utilities Co., Case No. PU-15-90, Rate of Return, August 2015
- Northern States Power, Case No. PU-400-04-578, Rate of Return, March 2005

Pennsylvania

- UGI Utilities, Inc. – Electric Division, Docket No. R-2021-3023618, Rate of Return, May 2021
- Pennsylvania American Water Company, Docket No. P-2021-3022426, Rate of Return, February 2021
- Audubon Water Company, Docket No. R-2020-3020919, Rate of Return, November 2020
- Pennsylvania American Water Company, Docket No. R-2020-3019369 and R-2020-3019371, Rate of Return, September 2020
- Twin Lakes Utilities, Inc., Docket No. R-2019-3010958, Rate of Return, October 2019
- City of Lancaster Sewer Fund, Docket No. R-2019-3010955, Rate of Return, October 2019
- Community Utilities of Pennsylvania Inc. Wastewater Division, Docket No. R-2019-3008948, Rate of Return, July 2019
- Community Utilities of Pennsylvania Inc. Water Division, Docket No. R-2019-3008947, Rate of Return, July 2019
- Newtown Artesian Water Company, Docket No. R-20019-3006904, Rate of Return, May 2019
- Hidden Valley Utility Services, L.P. – Wastewater Division, Docket No. R-2018-3001307, Rate of Return, September 2018
- Hidden Valley Utility Services, L.P. – Water Division, Docket No. R-2018-3001306, Rate of Return, September 2018
- The York Water Company, Docket No. R-2018-3000019, Rate of Return, August 2018
- SUEZ PA Pennsylvania, Inc., Docket No. R-2018-000834, Rate of Return, July 2018
- UGI Utilities, Inc. – Electric Division, Docket No. R-2017-2640058, Rate of Return, April 2018
- Wellsboro Electric Company, Docket No. R-2016-2531551, Rate of Return, December 2016
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2016-2531550, Rate of Return, December 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2016-2529660, Rate of Return, June 2016
- Columbia Gas of Pennsylvania, Inc., Docket No. R-2015-2468056, Rate of Return, June 2015
- Pike County Light & Power Company, Docket No. R-2013-2397353 (gas), Rate of Return, April 2014
- Pike County Light & Power Company, Docket No. R-2013-2397237 (electric), Rate of Return, April 2014
- Columbia Water Company, Docket No. R-2013-2360798, Rate of Return, August 2013
- Peoples TWP LLC, Docket No. R-2013-2355886, Rate of Return, July 2013
- City of Dubois – Bureau of Water, Docket No. R-2013-2350509, Rate of Return, July 2013
- City of Lancaster – Sewer Fund, Docket No. R-2012-2310366, Rate of Return, December 2012
- Wellsboro Electric Company, Docket No. R-2010-2172665, Rate of Return, September 2010
- Citizens' Electric Company of Lewisburg, PA, Docket No. R-2010-2172662, Rate of Return, September 2010
- T.W. Phillips Gas and Oil Company, Docket No. R-2010-2167797, Rate of Return, August 2010
- York Water Company, Docket No. R-2010-2157140, Rate of Return, August 2010

- Joint Application of The Peoples Natural Gas Company, Dominion Resources, Inc. and Peoples Hope Gas Company LLC, Docket No. A-2008-2063737, Financial Analysis, December 2008
- York Water Company, Docket No. R-2008-2023067, Rate of Return, August 2008

South Carolina

- Palmetto Wastewater Reclamation, Inc., Docket No. 2021-153-S, Rate of Return, September 2021
- Dominion Energy South Carolina, Inc., Docket No. 2020-125-E, Rate of Return, November 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Rate of Return, May 2020
- Palmetto Utilities, Inc., Docket No. 2019-281-S, Accounting, May 2020
- Blue Granite Water Company, Docket No. 2019-290-WS, Rate of Return, January 2020

Vermont

- Central Vermont Public Service Corp., Docket No. 7321, Rate of Return, September 2007

Wisconsin

- American Transmission Company, LLC, ITC, Midwest, LLC, Case No. 19-CV-3418, financial and regulatory analysis regarding requested temporary injunction to halt the construction in Wisconsin of the proposed Cardinal-Hickory Creek transmission line, October 2021

APPENDIX C: EXHIBITS